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1981 BUDGET EXPLANATORY NOTES



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U.S. DEPARTMENT OF AGRICULTURE
SCIENCE AND EDUCATION ADMINISTRATION

SCIENCE AND EDUCATION ADMINISTRATION

Purpose Statement

The Science and Education Administration (SEA) provides overall coordination, planning and support for food and agricultural science and education programs. It conducts and supports research across the broad range of food and agricultural sciences, including human nutrition. SEA communicates and demonstrates the results of this research to farmers, processors, consumers, and other groups. It provides facts and expertise in support of the policy and regulatory functions and of "action" programs of the Department of Agriculture and other government agencies. Other work includes developing and maintaining library and computer information systems to assist the public, researchers, and educators. SEA also responds to International food and agriculture needs through research and education.

SEA enables the USDA to carry out more effectively the "lead agency" role assigned to it by the Food and Agriculture Act of 1977. SEA units include Agricultural Research, which conducts basic and applied research at more than 150 locations in the U.S. and overseas; Cooperative Research, which makes funds available to state agricultural experiment stations and coordinates State-Federal research involving more than 100 institutions and agencies; Extension, which works in partnership with the Cooperative State Extension Services and their county agents in 3,150 offices across the country; Technical Information Systems, which maintains a permanent collection of materials on food and agriculture and helps the public use a vast library and computerized information retrieval system, and the Human Nutrition Center, which directs and coordinates Federally funded research in human nutrition. SEA's Joint Program Planning and Evaluation Staff coordinates priority programs like energy, human nutrition, and natural resources through special project leaders working with regular program managers. It also provides support to two top advisory bodies created by the Food and Agricultural Act: The Joint Council on Food and Agricultural Sciences and the National Agricultural Research and Extension Users Advisory Board.

SCIENCE AND EDUCATION ADMINISTRATION

Available Funds and Staff-Years

1979 and Estimated 1980 and 1981

Item			Estimated Available		Budget Estimate	
	Actual, 1979		1980		1981	
	Amount	: Staff-: Years	Amount	: Staff-: Years	Amount	: Staff-: Years
Direct Appropriation:						
Agricultural Research 1/	\$344,474,000	9,297	\$380,828,000	8,958	\$402,739,000	8,861
Building & Facilities	36,740,000	- -	- -	- -	- -	- -
Cooperative Research	174,395,000	98	189,045,000	98	197,773,000	98
Extension	263,899,000	204	274,037,000	204	286,634,000	204
Higher Education	11,500,000	- -	11,500,000	- -	11,500,000	- -
Technical Info. Systems ..	7,527,000	202	8,048,000	202	8,789,000	202
Total, Direct						
Appropriation	838,535,000	9,801	863,458,000	9,462	907,435,000	9,365
Deduct Allotments to other Agencies:						
Forest Service	-380,000	-2	-386,000	-4	-389,000	-4
National Science Foundation	-540,000	- -	-540,000	- -	-540,000	- -
Net	837,615,000	9,799	862,532,000	9,458	906,506,000	9,361
Obligations from other USDA Appropriations:						
Agricultural Research....	7,495,530	117	8,344,720	139	8,344,720	139
Extension	1,526,031	- -	2,597,000	- -	1,242,000	- -
Technical Info. Systems..	275,102	9	282,900	9	282,900	9
Total, Other USDA						
Appropriations.....	9,296,663	126	11,224,620	148	9,869,620	148
Total, Agriculture						
Appropriations.....	846,911,663	9,925	873,756,620	9,606	916,375,620	9,509
Other Federal Funds:						
Agricultural Research....	9,435,820	67	12,292,594	120	12,292,594	120
Cooperative Research....	1,546,673	- -	2,419,700	- -	1,919,700	- -
Extension	2,464,912	- -	2,815,000	- -	65,000	- -
Technical Info. Systems..	19,897	- -	- -	- -	- -	- -
Total, Other Federal Funds.....	13,467,302	67	17,527,294	120	14,277,294	120
Non-Federal Funds:						
Agricultural Research....	2,233,912	32	2,379,686	47	2,379,686	47
Extension.....	562,187	- -	675,000	- -	675,000	- -
Technical Info. Systems..	61,801	- -	50,400	- -	50,400	- -
Total, Non-Federal Funds.....	2,857,900	32	3,105,086	47	3,105,086	47
Total, Science and Education:						
Administration.....	863,236,865	10,024	894,389,000	9,773	933,758,000	9,676

1/ Reappropriation of \$2,000,000 included in FY 1979 and FY 1980.

End-of-Year Employment:	1979 Actual	1980 Estimated	1981 Estimated
Permanent Full-time:			
Agricultural Research...	7,609	7,817	7,817
Cooperative Research....	88	101	101
Extension	146	180	180
Technical Info. Systems.	187	202	202
Total, Permanent Full-time.....	8,030 1/	8,300	8,300
Other than Permanent:			
Agricultural Research...	1,510	1,306	1,306
Cooperative Research....	8	6	6
Extension.....	15	12	12
Technical Info. Systems.	32	26	26
Total, Other.....	1,565	1,350	1,350

AR Staff 9548

	<u>1979 Actual</u>	<u>1980 Estimated</u>	<u>1981 Estimated</u>
Youth Program and Development Positions under the Worker- Trainee Opportunity Program..	<u>307</u>	<u>300</u>	<u>300</u>
Total	<u>9,902</u>	<u>9,950</u>	<u>9,950</u>

1/ Excludes 54 permanent full-time employees affected by transfer to Office of International Cooperation and Development in FY 1980.

SCIENCE AND EDUCATION ADMINISTRATION

Permanent Positions by Grade and Staff-Year Summary

1979 Actual : 1980 Estimate and 1981 Estimate

Positions at rates
Established by act June 20,
1978 (5 U.S.C. 3104).

Permanent Positions by Grade and Staff-Year Summary

1979 Actual, 1980 Estimate and 1981 Estimate (Continued)

Grade	1979 Actual			1980 Estimate			1981 Estimate		
	Headquarters	Field	Total	Headquarters	Field	Total	Headquarters	Field	Total
Grades Established under the Foreign National Pay Plan.....	36	22	58	—	—	—	22	22	22
Grades Established by the Administrator Agency for International Development	14	14	28	—	—	—	—	—	—
Pursuant to Public Law 665:	4	1,320	1,324	4	1,279	1,283	4	1,279	1,283
Total Permanent Positions..	1,151	8,060	9,211	1,341	7,548	8,889	1,341	7,548	8,889
Staff Years:									
Permanent.....	1,079	7,666	8,745	1,113	7,543	8,656	1,113	7,446	8,559
Other.....	95	1,184	1,279	95	1,022	1,117	95	1,022	1,117
Total	1,174	8,850	10,024	1,208	8,565	9,773	1,208	8,468	9,676

SCIENCE AND EDUCATION ADMINISTRATION

CLASSIFICATION BY OBJECTS

1979 and Estimated 1980 and 1981

	<u>1979 Actual</u>	<u>1980 Estimated</u>	<u>1981 Estimated</u>
Personnel Compensation:			
Headquarters.....	\$27,230,000	\$29,311,000	\$29,898,000
Field.....	<u>180,629,000</u>	<u>184,636,000</u>	<u>188,333,000</u>
11 Total Personnel Compensation.....	207,859,000	213,947,000	218,231,000
Other Objects:			
12.1 Personnel benefits, civilian 1/.....	41,072,000	43,289,000	45,125,000
21.0 Travel and transportation of persons.....	5,015,000	4,773,000	5,602,000
22.0 Transportation of things.....	1,097,000	1,692,000	1,850,000
23.1 Standard level user charges.....	3,595,000	4,045,000	4,323,000
23.2 Communications, utilities and other rent.....	31,738,000	36,880,000	40,507,000
24.0 Printing and reproduction.....	2,346,000	2,832,000	3,175,000
25.0 Other services.....	57,331,000	83,966,000	89,559,000
26.0 Supplies and materials..	30,342,000	34,049,000	36,080,000
31.0 Equipment.....	24,522,000	29,014,000	31,914,000
32.0 Lands and structures...	19,320,000	37,685,000	32,340,000
41.0 Grants, subsidies, and contributions.....	<u>397,750,000</u>	<u>420,685,000</u>	<u>437,820,000</u>
Total other objects.....	<u>614,128,000</u>	<u>698,910,000</u>	<u>728,295,000</u>
Total obligations.....	<u>821,987,000</u>	<u>912,857,000</u>	<u>946,526,000</u>
Position Data:			
Average Salary, ES positions	--	\$50,073	\$50,073
Average Salary, GS positions	\$22,955	\$24,506	\$24,506
Average Grade, GS positions	9.48	9.47	9.47
Average Salary of Ungraded positions.....	\$16,564	\$17,705	\$17,705

1/ Includes retirement and compensation costs for extension agents.

SCIENCE AND EDUCATION ADMINISTRATION

Appropriation Act, 1980.....	\$852,990,000	a/
Budget Estimate, 1981.....	907,435,000	
Increase in Appropriation.....	+54,445,000	

Adjustments in 1980:

Appropriation Act, 1980.....	\$852,990,000	
1980 Supplemental Appropriation for pay costs.....	+9,463,000	
Transfer in Estimate b/.....	-995,000	
Adjusted base for 1981.....	861,458,000	
Budget estimate, 1981.....	907,435,000	
Increase over adjusted 1980.....	+45,977,000	

a/ Excludes reappropriation of \$2.0 million of prior year moneys used for additional labor, subprofessional and junior scientific help in the field.
 b/ Transfer in the Estimates to the Office of International Cooperation and Development for program support functions relating to international program activities.

SUMMARY OF INCREASES AND DECREASES
(On basis of adjusted appropriation)

<u>Item of Change</u>	<u>1980 Estimated</u>	<u>Program Changes</u>	<u>1981 Estimated</u>
SEA Unit:			
Agricultural Research.....	\$374,928,000	+\$27,811,000	\$402,739,000
Cooperative Research.....	189,045,000	+8,728,000	197,773,000
Extension.....	285,537,000	+12,597,000	298,134,000
Technical Information Systems....	8,048,000	+741,000	8,789,000
 Subtotal.....	 857,558,000	 +49,877,000	 907,435,000
Non-recurring Construction.....	3,900,000	-3,900,000	--
 TOTAL AVAILABLE.....	 861,458,000	 +45,977,000a/	 907,435,000

a/ Includes a total increase of \$33,885,000 toward increased operating costs in order to sustain performance levels for continuing programs.
 Includes a total increase of \$6,604,000 for the portion of pay increases effective in FY 1980 which were absorbed in FY 1980 but which are necessary to carry out the programs proposed for FY 1981.

Science and Education Administration research and extension activities have been reviewed and evaluated on an agency-wide basis. The table below shows changes, on an activity basis, proposed for FY 1981 over FY 1980.

	<u>Budget Authority</u>			<u>Change 1980 to 1981</u>
	<u>1979</u>	<u>1980</u>	<u>1981</u>	
Crop Productivity.....	\$137,625	\$152,694	\$168,148	+\$15,454
Crop Protection.....	96,500	104,692	117,595	+12,903
Animal Productivity.....	63,764	72,002	71,799	-203
Animal Protection.....	71,407	72,761	69,671	-3,090
Food Quality and Safety.....	42,329	45,719	47,014	+1,295
Food Protection, Distribution & Exports.....	32,177	33,397	35,478	+2,081
Technology and Safety of Non-food Agricultural Products.....	27,467	26,150	22,955	-3,195
Economics and Farm Management.....	17,168	17,873	17,995	+122
Human Nutrition.....	84,307	89,476	103,450	+13,974
Family and Consumer Development.....	44,715	46,774	48,076	+1,302
Youth Development (4-H).....	70,683	73,735	78,425	+4,690
Rural and Community Development.....	26,702	26,964	23,504	-3,460
Land and Water Resources.....	59,814	66,662	72,655	+5,993
Forestry and Range Resources.....	19,610	20,611	21,881	+1,270
Technical Information Systems.....	7,527	8,048	8,789	+741
 Subtotal.....	 801,795	 857,558	 907,435	 +49,877
Construction (non-recurring).....	36,740	3,900	--	-3,900
Total.....	838,535	a/ 861,458	907,435	+45,977

a/ FY 1979 includes reappropriation of \$2.0 million of prior year's moneys used for additional labor, subprofessional and junior scientific help in the Field.

Specific justification of increases and decreases within these totals are described in the following sections of these explanatory notes.

SCIENCE AND EDUCATION ADMINISTRATION
AGRICULTURAL RESEARCH

Purpose Statement

Agricultural Research was established on November 2, 1953, pursuant to authority vested in the Secretary of Agriculture by 5 U.S.C. 301 and Reorganization Plan No. 2 of 1953, and other authorities.

The research performed by Agricultural Research (AR) is authorized by the Department of Agriculture Organic Act of 1862 (5 U.S.C. 511), the Research and Marketing Act of 1946, as amended (7 U.S.C. 427, 427i), and the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (P.L. 95-113).

Agricultural Research is responsible for conducting basic, applied and developmental research of:

- Animal production
- Plant production
- Use and improvement of soil, water, and air
- Processing, storage, distribution, food safety, and consumer services
- Human nutrition research

The research applies to a wide range of goals; commodities; natural resources; fields of science; and geographic, climatic, and environmental conditions. It is categorized into 67 AR National Research Programs and eight Special Research Programs.

The mission of AR research is to develop new knowledge and technology which will insure an abundance of high quality agricultural commodities and products at reasonable prices to meet the increasing needs of an expanding economy and to provide for the continued improvement in the standard of living of all Americans. This mission focuses on the development of technical information and technical products which bear directly on the needs to (1) manage and use the Nation's soil, water, air, and climatic resources, and improve the Nation's environment; (2) provide an adequate supply of agricultural products by practices that will maintain a permanent and effective agriculture; (3) improve the nutrition and well-being of the American people; (4) improve living in rural America; (5) strengthen the Nation's balance of payments; and (6) promote world peace.

Research is conducted at numerous field locations in the States, District of Columbia, Puerto Rico, the Virgin Islands, and in several foreign countries. Much of the work is conducted in direct cooperation with the State agricultural experiment stations, other State and Federal agencies, and private organizations.

Central offices for the Deputy Director of AR and his staff, which are in the Washington, D.C. Metropolitan Area, provide overall leadership and direction to the programs and activities assigned to Agricultural Research. The field activities are managed on a geographical basis through four Regional Offices, 19 Area Offices, and seven major Research Centers. Research activities are carried out at 152 separate field locations. As of September 30, 1979, AR employed 7,663 PFT employees and 1,510 other than permanent employees.

SCIENCE AND EDUCATION ADMINISTRATION

The estimates include proposed changes in the Language of this item as follows (new language underscored; deleted matter enclosed in brackets).

Agricultural Research

For necessary expenses to enable Agricultural Research to perform agricultural research and demonstration relating to production, utilization, marketing, and distribution (not otherwise provided for), home economics or nutrition and consumer use, and for acquisition of lands by donation, exchange, or purchase at a nominal cost not to exceed \$100, [Except that the foregoing limitation shall not apply to the acquisition of lands for the research laboratory at Weslaco, Texas,] \$402,739,000: Provided, That appropriations hereunder shall be available for field employment pursuant to the second sentence section 706(a) of the Organic Act of 1944 (7 U.S.C. 2225), and not to exceed \$115,000 shall be available for employment under 5 U.S.C. 3109: Provided further, That appropriations hereunder shall be available for the operation and maintenance of aircraft and the purchase of not to exceed one for replacement only: Provided further, That of the appropriations hereunder, not less than \$10,526,600 shall be available to conduct marketing research: Provided further, That appropriations hereunder shall be available pursuant to 7 U.S.C. 2250 for the construction, alteration, and repair of buildings and improvements, but, unless otherwise provided, the cost of constructing any one building (except headhouses connecting greenhouses) shall not exceed [\$80,000] \$90,000 except for ten buildings to be constructed or improved at a cost not to exceed [\$150,000] \$176,000 each, and the cost of altering any one building during the fiscal year shall not exceed 10 percentum of the current replacement value of the building or \$90,000 whichever is greater: Provided further, That the limitations on construction contained in this Act shall not apply to the establishment of a fruit and nut germ plasm repository at Davis, California [construction of a greenhouse/headhouse at Stillwater, Oklahoma, construction of a feedmill at El Reno, Oklahoma and the construction of a greenhouse/headhouse at Fargo, North Dakota]: Provided further, That the limitations on alterations contained in this Act shall not apply to a total of \$100,000 for facilities at Beltsville, Maryland: Provided further, That the foregoing limitations shall not apply to replacement of buildings needed to carry out the Act of April 24, 1948 (21 U.S.C. 113a).

Special fund: To provide for additional labor, subprofessional, and junior scientific help to be employed under contracts and cooperative agreements to strengthen the work at Federal research installations in the field, not more than \$2,000,000 of the amount appropriated under the "Agricultural Research [Service]" heading for the previous fiscal year may be used by the Director, Agricultural Research in departmental research programs in the current fiscal year, the amount so used to be transferred to and merged with the appropriation otherwise available under "Agricultural Research".

The first change proposes deletion of language which authorized the Department to purchase land and facilities at Weslaco, Texas. The land and facilities will be purchased in FY 1980 and the language will not be required in FY 1981.

The second change would increase the cost limitation of (1) constructing any one building (except headhouses connecting greenhouses) from \$80,000 to \$90,000, and (2) increase the cost of building ten buildings from \$150,000 to \$176,000.

The construction cost limitation on buildings should be increased in fiscal year 1981 to maintain the previous values of these authorizations. The escalation from October 1980 to October 1981 alone will be approximately 10 percent.

The third change provides that, the cost of altering any one building during the fiscal year shall not exceed 10 percentum of the current replacement value of the building or \$90,000 whichever is greater. The Agency has found it increasingly difficult and sometimes impossible to effect needed alteration on small buildings under the strict 10 percent replacement cost formula. The "or \$90,000 whichever is greater" language is requested to allow establishment of an alteration cost ceiling for buildings with replacement value less than \$900,000. This would give flexibility in determining whether alteration of an existing building would be more desirable as an alternative to building a new facility.

The fourth change proposes deletion of language pertaining to the construction of a greenhouse/headhouse at Stillwater, Oklahoma, construction of a feedmill at El Reno, Oklahoma and the construction of a greenhouse/headhouse at Fargo, North Dakota. Funds will be obligated in FY 1980 and the language will not be required in FY 1981.

The fifth change deletes unnecessary language resulting from the reorganization of the United States Department of Agriculture under Title 14 of the "Food and Agricultural Act of 1977". Fiscal year 1979 was the last year of the "Agricultural Research Service" account. In order to reappropriate FY 1980 funds in FY 1981, proper reference must be made to the "Agricultural Research" account.

Agricultural Research

Appropriation Act, 1980.....	\$370,573,000a/
Budget Estimate.....	<u>402,739,000</u>
Increase in appropriation.....	<u>+32,166,000</u>

Adjustment in 1980:

Appropriation Act, 1980.....	\$370,573,000
Transfer in Estimate.....	- 995,000b/
1980 Supplemental Appropriations for Pay Costs.....	<u>+9,250,000</u>
Adjusted base for 1981.....	\$378,828,000
Budget Estimate, 1981.....	402,739,000
Increase over adjusted 1980.....	<u>+23,911,000</u>

a/ Excludes reappropriation of \$2,000,000 of prior year funds for additional labor, subprofessional and junior scientific help in the field.

b/ Pursuant to Secretary's Memorandum No. 1998, dated October 26, 1979, select international research activities were to be transferred from this account to the Office of International Cooperation and Development (OICD). Actual transfer of \$653 thousand is estimated in 1980. On comparable basis, the full annual cost of the activity, including pay costs, is \$995 thousand in FY 1980 and \$1,005 thousand in FY 1981.

SUMMARY OF INCREASES AND DECREASES

(on basis of adjusted appropriation)

<u>Item of Change</u>	<u>1980 Estimated</u>	<u>Program Changes</u>	<u>1981 Estimated</u>
Expanded basic agricultural research.....	\$150,716,000	\$ +7,300,000	\$158,016,000
Integrated pest management (IPM) and biocontrol of pests.....	6,150,000	+1,000,000	7,150,000
Guayule research.....	65,000	+600,000	665,000
Germplasm resources.....	12,743,000	+400,000	13,143,000
Research on aerospace technology (AGRISTARS).....	4,300,000	+700,000	5,000,000
Insure the health and safety of food supplies.....	11,004,000	+100,000	11,104,000
Human nutrition requirements....	30,457,000	+4,000,000	34,457,000
Expanded small farms research...	3,750,000	+250,000	4,000,000
Energy retrofit of facilities...	--	+3,500,000	3,500,000
Contagious Equine Metritis.....	500,000	-500,000	--
Mint research.....	201,000	-50,000	151,000
Tobacco production research....	1,048,000	-1,048,000	--

<u>Item of Change</u>	<u>1980 Estimated</u>	<u>Program Changes</u>	<u>1981 Estimated</u>
Bee disease research.....	\$ 406,000	-71,000	335,000
Beef forage crop study.....	60,000	-60,000	--
Sugarcane production research...	2,031,000	-350,000	1,681,000
Wool and mohair research.....	1,224,000	-1,224,000	--
Development of high quality potatoes.....	311,000	-72,000	239,000
Research on sweet potato quality.....	220,000	-102,000	118,000
Aquaculture for food and feed...	100,000	-100,000	--
Industrial uses of farm products.....	5,885,000	-1,779,000	4,106,000
Research on mosquito genetics...	1,509,000	-53,000	1,456,000
Tobacco insect research.....	797,000	-182,000	615,000
Pork standards Handbook No. 8..	263,000	-63,000	200,000
Non-recurring construction items.....	3,900,000	-3,900,000	--
All Other.....	<u>141,188,000</u>	<u>+15,615,000^{a/}</u>	<u>156,803,000</u>
Total Available.....	<u>\$378,828,000</u>	<u>+23,911,000</u>	<u>\$402,739,000</u>

a/ Includes a total increase of \$9,731,000 toward increased operating costs in order to sustain performance levels for continuing programs. Includes a total increase of \$5,884,000 for the portion of pay increases effective in FY 1980 which were absorbed in FY 1980 but which are necessary to carry out the programs proposed for FY 1981.

Project Statement
(On basis of adjusted appropriation)

Project	1979 Actual	1980 (Estimated)	Increase or Decrease	1981 (Estimated)
1. <u>Research on animal production:</u>				
(a) Animal production efficiency research...	\$ 64,165,837	\$ 69,064,200	\$ +5,344,000	\$ 74,408,200
(b) Research on housing...	<u>380,305</u>	<u>389,000</u>	--	<u>389,000</u>
Total, Research on animal production.....	64,546,142	69,453,200	+5,344,000 ⁽¹⁾	74,797,200
2. <u>Research on plant production:</u>				
(a) Plant production efficiency research.....	128,293,608	139,927,900	+11,476,000	151,403,900
(b) Tropical/Subtropical agricultural research.	<u>1,438,299</u>	<u>2,664,900</u>	--	<u>2,664,900</u>
Total, Research on plant production.....	129,731,907	142,592,800	+11,476,000 ⁽²⁾	154,068,800
3. <u>Research on the use and improvement of soil, water and air:</u>				
(a) Research on conservation and use of land and water resources and maintaining environmental quality.....	31,800,699	35,472,000	+2,453,000	37,925,000
(b) Research on watershed development.....	<u>10,451,924</u>	<u>13,214,600</u>	<u>+668,000</u>	<u>13,882,600</u>
Total, Research on the use and improvement of soil, water and air.....	42,252,623	48,686,600	+3,121,000 ⁽³⁾	51,807,600
4. <u>Processing, storage and distribution, food safety & consumer services research:</u>				
(a) Processing, storage and distribution efficiency research.....	51,509,331	54,712,400	-1,382,000	53,330,400
(b) Research to expand agricultural exports..	2,696,395	2,588,600	+12,000	2,600,600
(c) Research to improve human health and safety.....	15,910,837	18,530,900	+957,000	19,487,900
(d) Research on consumer services.....	<u>474,415</u>	<u>690,700</u>	--	<u>690,700</u>
Total, Processing, storage and distribution, food safety, and consumer services research.....	70,590,978	76,522,600	-413,000 ⁽⁴⁾	76,109,600
5. <u>Research on human nutrition.....</u>	21,290,208	30,456,800	+4,783,000 ⁽⁵⁾	35,239,800
6. <u>Repair and maintenance of facilities and energy retrofit.....</u>	8,216,000	8,216,000	+3,500,000 ⁽⁶⁾	11,716,000

Project	1979 Actual	1980 (Estimated)	Increase or Decrease	1981 (Estimated)
7. Construction of facilities.....	\$ --	\$ 3,900,000	\$ -3,900,000 ⁽⁷⁾	--
8. Contingency Research Fund.....	1,000,000	1,000,000	--	1,000,000
Unobligated balance....	6,846,142	--	--	--
Subtotal.....	<u>\$344,474,000</u>	<u>\$380,828,000</u>	<u>\$+23,911,000</u>	<u>\$404,739,000</u>
Deduct reappropriation.	<u>-2,000,000</u>	<u>-2,000,000</u>	<u>--</u>	<u>-2,000,000</u>
Total available or estimate.....	<u>\$342,474,000</u>	<u>\$378,828,000</u>	<u>\$+23,911,000</u>	<u>\$402,739,000</u>
 Transfer in Estimate:				
To APHIS.....	+ 87,000	--		
To OICD.....	+855,000	+995,000		
Supplemental for pay costs.....	--	<u>-9,250,000</u>		
Total, Appropriation...	<u>\$343,416,000</u>	<u>\$370,573,000</u>		

AGRICULTURAL RESEARCH

Explanation of Program

Under the Agriculture, Rural Development and Related Agencies Appropriation Act of 1980, Agricultural Research carries out the following activities:

1. Research on Animal production. -- Research is conducted to improve livestock productivity (including poultry) through improved breeding, feeding, and management practices, and to develop methods for controlling diseases, parasites, and insect pests affecting them.
2. Research on plant production. -- Research is conducted to improve plant productivity through improved varieties of food, feed, fiber, and other plants; develop new crop resources; and improve crop production practices, including methods to control plant diseases, nematodes, insects, and weeds.
3. Research on the use and improvement of soil, air, and water. -- Research is conducted to improve the management of natural resources, including investigations to improve soil and water management, irrigation and conservation practices; to protect natural resources from harmful effects of soil, water, and air pollutants, and to minimize certain agricultural pollution problems, and to determine the relation of soil types and water to plant, animal, and human nutrition. The research includes studies on hydrologic problems of agricultural watersheds. Research is also conducted on the application of remote sensing techniques in meeting agricultural problems, and on effects of the reduction of ozone.
4. Processing, storage, distribution, and food safety research. -- Research is conducted to develop new and improved fabrics and industrial products and processes for agricultural commodities for domestic and foreign markets, including ways to minimize processing wastes. Research is conducted on the processing, transportation, storage, wholesaling and retailing of products.
Research is conducted on problems of human health and safety, including means to insure the safety of food and feed supplies; control insects pests of man and his belongings; and reduce the hazards to human life resulting from pesticide residues and other causes.
5. Human nutrition research. -- Research is conducted on human nutritional requirements and the composition and nutritive value of food as needed by consumers, and by Federal, State, and local agencies administering food and nutrition programs.

The research performed by Agricultural Research is authorized by the Department of Agriculture Organic Act of 1862 (5 U.S.C. 511) and the Research and Marketing Act of 1946, as amended (7 U.S.C. 427, 427i).

JUSTIFICATION OF INCREASES AND DECREASES

(1) A net increase of \$5,344,000 for research on animal production consisting of:

(a) An increase of \$1,194,000 for 1980 pay increases:

(b) An increase of \$2,650,000 in basic animal research (\$32,894,000 available in FY 1980).

Need for Change: Important breakthroughs in animal production now are highly dependent on understanding biological processes of growth. The molecular biology and metabolism of living cells must be understood to provide the springboard for further progress. New concepts and applications in efficient animal production flow from new knowledge in physiology, genetics, nutrition, metabolism and the physical sciences. Detailed information on food producing animals is lacking when compared to that for humans. Many of the leads developed in basic research on humans and laboratory animals need to be extended to farm animals to support applied research programs.

There is need for additional research to enhance the nutritional quality of foods and modification of meat composition to produce optimum quality for human diets. There is also a need for research on growth, including the effects of hormonal, neural, biochemical and environmental interactions on muscle, fat cell and bone growth.

New basic findings in the area of animal diseases, parasites and insects through the application of molecular biology, physiology, biochemistry, immunology, virology, and toxicology are needed to develop more effective protection of livestock and poultry. More effective immunity and less hazardous vaccines have long range potential of permitting development of highly developed immunity mechanisms to improve nonchemical methods of protection against enteric, respiratory and reproductive diseases, blood sucking insects, internal parasites and various severe virus diseases.

Nature of Change: The basic animal research in this program will provide a more complete understanding of biological processes, lead to increased production, continue to control diseases, reduce the dependency of animal agriculture on drugs and improve the quality of food from animals.

Research will be conducted with the following specific objectives:

- Identify environmental stresses, including diseases, parasites, chemicals, as they affect the production of livestock and poultry.
- To better understand growth regulation involving animal cellular, hormonal and immunological reactions to diseases, parasites, insects and other hazards.
- Study interrelationships between production practices and meat product quality for better understanding of mechanisms by which nutrients are synthesized, stored and metabolized in animals.
- More efficient production through increased utilization of forages and milk production by defining the mechanisms that affect nutrient needs, absorption and metabolism.

(c) An increase of \$2,000,000 to provide for increased operating costs in animal production.

Additional funding is essential to maintain the current level of program effort and to help provide managers with some flexibility to alter research programs toward new high priority animal protection and production problems. Costs for fuel, feed, fertilizer, equipment and other items used by researchers have increased with rising costs experienced throughout the economy. These funds will provide a measure of relief to managers and will assure that important research programs in disease and insect control and livestock production will continue.

(d) A decrease of \$500,000 for Contagious Equine Metritis research (\$500,000 available in 1980).

Need for Change: Reductions proposed in FY 1981 reflect the Department's policy to fund only research projects now considered as most essential to the Nation's agricultural and consumer needs. Achievement of this policy has been a major concern of the USDA in past years and has become even more critical in the preparation of the 1981 Budget given the overriding need to provide increases in other higher priority areas while holding overall spending to a minimum level.

Nature of Change: Currently the disease is confined to the States of Kentucky and Missouri and the extent of danger appears to be decreasing. The disease is presently being contained. Studies currently underway in Kentucky and Iowa and those planned will provide sufficient knowledge of potential threat to the equine industry of the United States without continuation of Federal funding.

(2) A net increase of \$11,476,000 for research on plant production consisting of:

(a) An increase of \$2,305,000 for 1980 pay increases.

(b) An increase of \$1,000,000 for integrated pest management (IPM) research and biocontrol of pests (\$6,150,000 available in 1980).

Need for Change: The costs to producers and consumers of chemicals used to control pests tripled between 1967 and 1975 to over \$4 billion. The use and costs of chemicals to control pests are still increasing. Despite use of pesticides and other current control methods, the reduction of potential agricultural yield and quality due to pests is about 30 percent or \$20 billion annually. Biological control is the cornerstone of IPM systems as all control components must be complementary with and must maximize the effectiveness of biological control agents that exist in nature.

Environmental concerns emphasize the need for IPM in order to reduce losses caused by pests, reduce costs of pest control, reduce environmental damage and optimize profits from superior production and pest management systems in broad ecological zones for producers, home owners, and the public generally. This increase would accelerate development of new improved biological control technologies in those areas that are the most serious barriers to rapid advancement of IPM systems.

Nature of Change: Initially, this increase will focus on biological control of corn pests. The IPM systems research will draw directly upon the results obtained from this funding level. Specifically, the increase funding will result in the increased acquisition of new biological control agents from abroad, improvement of certain available biological control agents by

genetic transformation and gene splicing, evaluation of all new agents under quarantine and subsequent field evaluation of the most promising agents. In addition, the increase would partially remedy the most critical deficiencies in taxonomic support of biocontrol including computerization of taxonomic and biocontrol data to increase efficiency. Success of this program will reduce the amount of pesticides used, thereby maintain or improve environmental quality and increase production efficiency.

In all cases, the personnel, facilities, equipment, and or plots are in place and research is in progress. Exotic biological control agents obtained by SEA inhouse programs that have cleared quarantine would be shipped to several Federal agencies, State Agricultural Experiment Stations, and universities. For coordination, each region in AR has a "working group on natural enemies" and they participate in coordinating activity of the National Working Group for Natural Enemies with liaison representatives from CR, IPS, APHIS, and EPA.

(c) An increase of \$3,900,000 for basic research on crops (\$57,334,000 available in FY 1980).

Need for Change: Basic research provides needed information for technological breakthroughs in crop productivity that enhance the Nation's ability to improve human nutrition, reduce inflation, expand exports, relieve the dependence on energy intensive manufactured fertilizers and minimize adverse impact of pests on crop production. The reserve of available basic research results has declined as nature and new demands of people continue to place new challenges upon our crop production capabilities. In its broadest aspect, this increase would include fundamental genetic studies, growth, and development of microorganisms, plants, seeds, and the physiology and biochemistry of biological systems including biological regulation, water use efficiency, stress, and nutritive quality.

In the area of pest control, the major objective of basic research is the discovery and expansion of pest vulnerabilities which will serve as the basis for pest control methods in future IPM systems. The planned effort would address basic research problems related to weeds, nematodes, insects, and plant pathogens. The research would be targeted so as to result in reduced pest losses, reduced costs, lower energy requirements, lower labor requirements, greater reliability, and less damage to the environment. The high yielding, environmentally acceptable crop production systems of the 80's and 90's will be based on results from basic research that provides the understanding and versatility needed for problem solving throughout agriculture.

Nature of Change: This basic research will be conducted by scientists who work closely with applied scientists engaged in developing improved crop management systems. A portion of the funds, about one-third, would be used to support efforts in cooperating universities. This will tie inhouse and university research together, promote creativity and enhance Federal-State cooperation and coordination. The research projects selected for increased effort would conform to the high priority problems already identified by SEA-stimulated regional planning efforts involving teaching, extension, and Federal and State research personnel.

SEA-AR maintains a critical mass of scientific experts and equipment for conducting fundamental studies on all aspects of plant growth and protection. This increase will provide new expertise and techniques to these existing research teams.

(d) An increase of \$400,000 for research on germplasm (\$12,743,000 available in FY 1980).

Need for Change: Increased effort on plant genetic resources is needed to (a) assure an adequate diversity of genetic material to provide a stable base for higher levels of productivity, (b) reduce possibilities of widespread devastating epidemics of insect and plant diseases, (c) reduce losses due to environmental stress, (d) provide new industrial and strategic raw materials, and (e) provide a wider choice of crops for producers in marginal production areas and for small farmers.

Nature of Change: Increased funding would be used to support and strengthen current efforts in the Office of Plant Introduction, the National Seed Storage Laboratory, four Regional Plant Introduction Stations, and several individual commodity collections such as the Small Grains Collection and the Soybean collection. The entire germplasm program is under the review of the National Plant Genetic Resources Board established by the Secretary of Agriculture. All programs involve joint Federal-State planning, responsibility and decision making to assure that all material is fully protected and utilized.

(e) An increase of \$600,000 for research on Guayule, a potential source of natural rubber (\$65,000 available in FY 1980).

Need for Change: The United States is now totally dependent on foreign sources for supplies of natural rubber. Imports of natural rubber costs the U.S. about \$150 million annually. Most natural rubber now comes from South East Asia where political instability is a continuing threat to supplies of this important product. Production estimates indicate that natural rubber supplies will be critically short by 1985 and prices of petroleum based synthetics are expected to continue rising. Development of a domestic source of natural rubber will aid economic development and increase employment in the Southwest, reduce dependence on foreign sources, strengthen defense stockpiling programs, improve foreign exchange balances, and provide another cropping alternative for the water scarce Southwest.

Nature of Change: Increased funding will be used to develop new high rubber yielding varieties capable of withstanding a diversity of environmental stress and to develop techniques, equipment, and procedures for planting, growing, harvesting, and processing the crop. Work will be carried out through inhouse scientists and through cooperative agreements with appropriate organizations knowledgeable and skilled in the agriculture of the Southwest and Mexico. Work will be closely coordinated with research on guayule now being carried out by the Government of Mexico. The specific projects will be in agreement with the overall development plan for the commercialization of guayule as identified by the Joint Commission specified in P.L. 95-592, The Native Latex Commercialization and Economic Development Act of 1978.

(f) An increase of \$250,000 for small farms research (\$3,750,000 available in FY 1980).

Need for Change: Current funding for a small farm research center in Arkansas was added by Congress in 1980. It is planned to locate research scientists in Arkansas to develop a multidisciplinary program in forage, livestock and horticultural crops. In order to get the program underway and make best use of land resources made available by the State of Arkansas, additional funds are needed to modernize facilities; establish

and fence pastures and orchards and to provide onsite structures to support the research program.

Nature of Change: Additional funds will provide for modest expansion of planned activities for 1980 and the additional in-house research support needed for meeting requirements for field demonstrations, extension type programs and cooperative research with associated institutions.

(g) An increase of \$4,600,000 to provide for increased operating costs in crop production.

Additional funding is essential to maintain the current level of program effort and to help provide managers with some flexibility to alter research programs toward new high priority crop protection and production problems. Costs for fuel, fertilizer, equipment and other items used by researchers have increased with rising costs experienced throughout the economy. These funds will provide a measure of relief to managers and will assure that important research programs such as insect and weed control, plant germ plasm, and fruit, vegetable and other crop production effort will continue.

(h) A decrease of \$1,579,000 from current funding for research projects that are considered not highly essential to meet the Nation's agricultural and consumer needs (\$3,746,000 available in FY 1980).

Need for Change: The decreases proposed in FY 1981 reflect the Department policy to emphasize and fund only research projects now regarded as most essential to the Nation's agricultural and consumer needs. This has been a major concern of the USDA in past years and has become even more critical in the preparation of the 1981 Budget given the need to provide increases for higher priority work while holding overall spending to a minimum.

The following are the specific areas being reduced:

Mint Research - \$50,000 - These funds were used in the current fiscal year to construct a greenhouse for mint genetic studies. Planned use of these funds in subsequent years in screening for disease resistance could be taken over by cooperating State programs.

Tobacco production - \$1,048,000 - The Department has determined that much of the current tobacco effort can be modified to emphasize health and safety related aspects of tobacco research. The balance of the funds, \$1,048,000 for research on the control of tobacco growth, culture, breeding, and quality of flue cured tobacco, burley tobacco, and insect control is considered primarily tobacco production oriented and is recommended for elimination in the 1981 budget.

Bee Diseases - \$71,000 - The proposed decrease would reduce the current program at one location the equivalent of one scientist man year. The impact on the national program to control brood diseases, which is essential to colony maintenance for crop pollination, will be partially minimized by recent increases for chalk brood disease.

Beef Forage Crops Study - \$60,000 - These funds were authorized by Congress to carry out a beef forage/crop residue study to determine the feasibility of making increased use of grass and other forage materials as ruminant meat animal feeds. The study was carried out by a joint task force of Federal, State, and industry researchers through a cooperative agreement with a land-grant university. The report is essentially completed and the funding no longer required.

Sugarcane Production - \$350,000 - Preliminary data indicate that yield of sugarcane in Louisiana can be increased by reducing the spacing between rows. However, research that was planned to develop the technology required to permit commercial use of close-row cane culture can be delayed. This research can be assumed by State or Cooperators.

(3) A net increase of \$3,121,000 for research on conservation and use of soil, water and air resources consisting of:

(a) An increase of \$740,000 for FY 1980 pay increases.

(b) An increase of \$200,000 for basic research on land and water and air resources (\$18,253,000 available in FY 1980).

Need for Change: Water is often the most limiting factor in food, fiber, and wood production. An indepth understanding of the dynamics and energetics of the soil-plant-air system is essential if we are to develop effective resource management strategies to correct or ameliorate water stress or make efficient use of plants that can tolerate high levels of water stress. Investigations must be at the most fundamental level of the soil, soil-root, and root shoots and organ-atmosphere level. This knowledge can then be incorporated into improved plant growth models and also used to improve resource management for crop production and control of nonpoint source pollution.

Nature of Change: This increased funding will strengthen the present basic research efforts to combat problems of water stress in crop production. This research provides the background base of fundamental knowledge which supports technological development and application. The programs are closely coordinated with basic research efforts in plant genetics and plant physiology and associated plant breeding programs. Scientists involved work closely with scientists currently engaged in crop modeling research and associated aspects of the research on aerospace technology.

(c) An increase of \$700,000 for research on Aerospace Technology (AGRISTARS) (\$4,300,000 available in FY 1980).

Need for Change: This increased interagency research effort will permit a more rapid acquisition of aerospace technology, tools, techniques, data, and information that will enable action agencies to perform their mandated programs more efficiently and in some instances more cost-effectively. ESCS would be able to make better production and marketing estimates for U. S. crops, FAS would be able to assess change in crop conditions more accurately using improved or new early warning alarms. The SCS and FS would be able to monitor and inventory conservation practices and renewable resources more efficiently and respond more effectively to various mandates of RCA and RPA. SCS would be able to monitor RCWP programs more efficiently and determine with greater precision the sites where best management practices are needed. SCS and EPA would be able to be more accurately assess the performance of conservation and pollution abatement practices.

Nature of Change: The increase is scheduled in the 6-year Agristars plan. It will allow SEA-AR to increase its efforts on the application of aerospace technology and remotely-sensed data to (a) developing physiological and phenological crop yield models, especially for soybeans, corn, and small grains other than wheat, (b) developing early warning alarms of unusual events (stress, insects, diseases) that affect crop production, (c) providing an inventory of conservation practices and assessing the effectiveness of conservation practices and pollution impacts, and (d) developing better hydrologic, sediment, and water quality models.

The current program is an integral part of the 6-year Agristar plan which is jointly planned and monitored by USDA, NASA, USDC, USDI, and AID, to insure that the needs of agriculture are being met.

(d) An increase of \$1,481,000 to provide for increased operating costs in the use and improvement of soil, water and air.

Additional funding is essential to maintain the current level of program effort and to help provide managers with some flexibility to alter research programs toward new high priority soil, water and air problem areas. Costs for fuel, supplies, equipment and other items used by researchers have increased with rising costs experienced throughout the economy. These funds will provide a measure of relief to managers and will assure that important conservation research programs which directly impact agriculture needs and which also have application to nonagricultural purposes are adequately maintained.

(4) A net decrease of \$413,000 for research in processing, storage, distribution, food safety and consumer services research consisting of:

(a) An increase of \$1,349,000 for FY 1980 pay increases.

(b) An increase of \$100,000 for food safety research (\$11,004.00) available in FY 1980.

Need for Change: The health and safety of the American public must be protected through detection and elimination of harmful microbial, fungal, natural toxic constituents and antinutritional factors in foods. Means must be developed to reduce the microbial contamination of foods at various steps in the food chain. Also, there is a need for means to rapidly detect deteriorative changes in foods, detect with great sensitivity the presence of antibiotics and other environmental chemical contaminants that have adverse effects on human health. It is imperative that emphasis be given to the continued development of non-destructive analytical procedures that will provide the regulatory agencies of government with means to rapidly monitor the safety of foods without product loss and that methods are developed to eliminate contamination or reduce it to the lowest practical and safe level. There is a need to intensify research to develop safer grain fumigants as several fumigants are involved in cancellation proceedings with the EPA.

Nature of Change: The additional funds will be used to expand the present effort to develop rapid detection and assessment techniques to be used mainly by the Food Safety and Quality Service of the Department. (Methods may also be used by other Federal regulatory agencies). The highest priority will be given to techniques to determine toxic

residue analysis, levels of food-borne microbial pathogens and/or their metabolic products, viruses, and/or cellular products reflecting their replication and residues of antibiotics transferred to edible tissues from the feed.

(c) An increase of \$1,650,000 to provide for increased operating costs in processing, storage, distribution, food safety and consumer services research:

Additional funding is essential to maintain the current level of program effort and to help provide managers with some flexibility to alter research programs toward new high priority programs conducted on problems of human health and safety and postharvest technology. Costs for fuel, supplies, equipment and other items used by researchers have increased with rising costs experienced throughout the economy. These funds will provide a measure of relief to managers and will assure that important research programs involved in insuring that food and feed supplies and products are free from toxic or potentially dangerous residues, harmful chemicals and microorganisms introduced from agricultural sources or during the processing operations.

(d) A decrease of \$3,512,000 from current funding for research projects that are considered not highly essential to meet the Nation's agricultural and consumer needs (\$10,046,000 available in 1980).

Need for Change: The decreases proposed in FY 1980 reflect the Department's policy to emphasize and fund only high priority research projects essential to the Nation's agricultural and consumer needs and not likely to be otherwise funded. This has been a major concern of the USDA in past years and has become even more critical in the preparation of the 1981 Budget given the Federal Government's commitment and need to provide increases for higher priority research while holding overall spending to a minimum.

The following are the specific decreases proposed:

Wool and mohair research - \$1,224,000 - consists of research to solve problems associated with the utilization of American wool by U.S. small woollen mills. All Federal research on wool would be terminated. The program is being reduced considering the ability of States or other cooperators to perform this activity

Industrial use of animal fats - \$258,000 consists of utilization research to develop new enzymatic methods for rendering animal fats and chemical modifications of animal derived fatty acids. The program is being reduced considering the ability of industry, or other cooperators to perform this activity.

Industrial uses of farm products - \$1,521,000. The proposed reduction will terminate Federal research to increase the utilization of cereals and oilseeds through the development of agriculturally based industrial products. This recommendation is based on industry's capabilities to assume this research program.

Tobacco insect research - \$182,000. This program deals with the development of biological, physical and physiological mechanisms and chemical agents for control of tobacco insects. This work can be assumed by industry.

Composition and nutritive values of sweet potatoes - \$102,000 - This program can be assumed by States or other cooperative organizations.

Market losses of potatoes - \$72,000 - This program involves the relationship of cultural practices and varieties on market losses; research relating production practices to market quality. This reduction considers the ability of States, industry or other cooperative organizations to perform this work.

Aquaculture for food and feed - \$100,000 - Research to resolve by-product utilization and pollution problems associated with fish farm enterprises. This decrease is recommended on the basis of State, or other public or private organizations' abilities to assume work. This decrease will be more than offset by a \$500 thousand increase for Special Grants proposed in the Cooperative Research portion of the SEA budget.
Mosquito genetics - \$53,000 - Research is being conducted on the genetics of Aedes segypti for the purpose of developing genetic control methods for this species. This project is essentially completed and funding will no longer be required. The effect on the national program will be minimal, and a group at Notre Dame University can fill the needs for further research in this area.

(5) A net increase of \$4,783,000 for research on human nutrition (\$26,000,000 available in fiscal year 1980) consisting of:

- (a) An increase of \$296,000 for 1980 pay increases.
- (b) An increase of \$1,700,000 for research on nutrition needs of elderly and relationship of nutrition to aging - Human Nutrition Laboratory, Tufts University, Boston, Mass. (\$2,000,000 available in 1980)

Need for Change. The percentage of the population in older age groups is rapidly increasing. Expenditures for food programs and medical programs for these groups are also increasing. To keep pace with these increases, it is extremely important to obtain information on the relationship of nutrition to aging and degenerative diseases (such as heart and circulatory system diseases, bone diseases including osteoporosis, cancer, etc.) and the nutrition requirements of the elderly. In fiscal year 1979 Congress provided funds for a USDA-Human Nutrition Laboratory on the campus of Tufts University in Boston, Mass. In fiscal year 1980, program funds were appropriated to initiate research on nutrition and aging. In fiscal year 1981, as the new facility becomes available for use, it will be critical to add new research funds to assure that critically needed information can be obtained within a reasonable length of time. It is anticipated that this new knowledge will be immediately applicable in health maintenance and food assistance programs.

Nature of Change. Three areas of research are planned for emphasis at the Tufts location in FY 1981. The first of these will investigate the relationship of nutrition to prevention and treatment of bone disease such as osteoporosis. This disease, in which bones become very susceptible to breaking, is a major problem among the elderly, particularly elderly women. Some evidence has suggested that appropriate nutrition intake can prevent development of this disease. Research is necessary to establish how nutrition affects osteoporosis and how a person's diet may help to prevent the disease.

A second area of research to be increased is the investigation of the relationship of nutrition to anemia in the elderly. Nutritional status surveys indicate that a sizable proportion of the elderly have anemia and this may limit their ability to do physical activity. Research is needed on the ways in which an elderly person's diet might help to prevent this anemia. Nutrition has many possible relationships to anemia; it is necessary to learn which of these are most related to anemia in the elderly. The possibility of iron deficiency anemia and specific problems in the absorption of iron by the elderly will be studied.

The third area of research proposed to receive emphasis in fiscal year 1981 is the relationship of nutrition to the ability of the elderly to resist infection. The body's mechanism of defense against infection, the immunological response mechanism, is thought to be strongly related to nutrition. However, much fundamental knowledge must be obtained to understand the ways in which this defense mechanism may promote or retard aging, or diseases associated with aging, and how nutrition influences these processes.

The approaches used in the research will include the study of human volunteers living in the community and living under metabolic ward conditions in the clinical research center of Tufts Medical Center. In addition, there will be studies using experimental animal models.

The research will be carried out by a core of USDA scientists within the laboratory, plus scientists of Tufts University working with USDA under a cooperative agreement, and by scientists in other universities within the geographic area who have related research findings.

(c) An increase of \$300,000 for research on nutrition needs of women during pregnancy and effects of the mother's nutrition on the health of the newborn infant - Children's Nutrition Laboratory, Baylor University, Houston, Tx. (\$2,500,000 available in FY 1980).

Need for Change. In fiscal year 1979 Congress established a USDA human nutrition laboratory, the Children's Nutrition Laboratory at the Baylor College of Medicine in Houston, Texas. This laboratory has undertaken a research program designed to provide information on nutrition which can be used to improve the health of the nation's infant. The research program to date has emphasized the study of nutrition needs of both mother and infant during breast feeding and the infant's nutrition needs during and shortly after weaning. However nutrition needs during breast feeding and the needs of the infant during breast feeding and the needs of the infant during weaning are dependent upon the health of the baby at birth. This, in turn, is dependent in part on the nutritional status of the mother. Scientists and physicians, participating in a workshop sponsored by the Children's Nutrition Laboratory in the fall of 1979, have specified much information, not now available, which is needed on nutrition needs during pregnancy and on the effects of the mother's nutrition on the health of her newborn infant.

Nature of Change. Emphasis will be given in fiscal year 1981 to the establishment of a research program identifying nutrition needs during pregnancy and the effects of the mother's nutrition on the health of the newborn infant. The direction of this new program will be guided by the priorities which were established in the 1979 workshop on

nutrition needs during pregnancy. Some of the funds added to the program in FY 1980, for the stable isotopes facility, will be redirected into this new program. The \$300,000 being requested here will specifically provide for the capability to measure energy needs directly during pregnancy. Currently, indirect estimates of energy needs of pregnant women provide the basis for recommendations to these women about their diet. These also furnish part of the basis for food allotments to low-income pregnant women participating in government programs. The information now available on energy needs during pregnancy is inadequate for making dietary recommendations. The capability for directly measuring human energy needs is very limited in the United States. The addition of this program for measuring energy requirements at the Baylor Laboratory will make a very significant contribution to our understanding of the nutrition needs of pregnant women.

The work will be carried out largely by university scientists working under a collaborative agreement with Baylor University, with a small core of Federal scientists.

(d) An increase of \$1,000,000 for research on the factors which affect food choices and on the nutrient composition of food. (\$5,365,000 available in FY 1980).

Need for Change. For effective nutrition education programs and to help people understand and to adopt nutritional practices which support good health, it is necessary to understand what factors influence people's food choices and their use of food. It is necessary also to understand the ways in which these factors can be handled to promote good nutritional practices. Little research has been done in this area. Therefore, it is necessary to build a capacity for doing good research of this type. Plans for a comprehensive research program in this area are being developed and the program is being initiated in 1980. However, an increased research effort in FY 1981 is required to meet the needs of food assistance programs for increasing the effectiveness of their nutrition education programs, and the critical needs of educators in federally funded nutrition education programs for knowledge about factors determining people's food choices.

The ever increasing number of new food products available for purchase and the variety of new ways in which these products are manufactured and are prepared in the home, places heavy demands on programs of analysis of the nutrient composition of foods. As knowledge of human requirements for certain trace minerals and vitamins is accumulated, there is increased demand by nutrition educators and by nutritionists in food programs, for more comprehensive measurement of these nutrients in common foods. Thus it will be necessary to increase research on the nutrient composition of food in fiscal year 1981.

Nature of Change. Research to provide information necessary to sound programs in dietary guidance and human nutrition education will be conducted, primarily through an extramural program of contracts and cooperative agreements, to utilize the best expertise available. Several outstanding researchers with expertise basic to this area will be called upon to give broad guidance to this research program. Research designed to provide information to improve techniques for transmitting clear and up-to-date nutrition knowledge to the American public will receive emphasis. Research will also be initiated to determine ways in which people can most effectively help themselves make needed changes which they want to make in their nutritional practices.

Research on the nutrient composition of new foods and on the amount and form in food of critical trace minerals and vitamins will be carried out by scientists in the Human Nutrition Center within SEA-AR, and the colleges and universities. Determinations of which analyses will be accomplished will be made by SEA scientists in cooperation with scientists and program leaders in the action and regulatory agencies who have special, pressing needs for these data.

(e) An increase of \$550,000 for basic research on factors in the human intestine which influence the ability to absorb nutrients. (\$15,504,000 available in 1980).

Need for Change. Knowledge of the nutrient composition of food is not adequate unless the forms of the nutrient in the food and their availability for absorption by the human are also understood. The availability of nutrients for absorption depends in part upon a combination of biological and chemical factors in the human intestine. The control of these factors and the ways in which they interact to promote or hinder nutrient absorption are poorly understood. More basic knowledge about biological and chemical processes in the human intestine during digestion and absorption of food will lead to better applied research on ways to promote nutrient absorption.

Nature of Change. Scientists in USDA nutrition laboratories and scientists in colleges and universities will collaborate to explore critical biological processes in the human intestine. This research will be designed in consultation with scientists having interest in more applied research on nutrient absorption so that results will be quickly used to improve studies of nutrient absorption. In particular, emphasis will be given to work which may lead to new techniques for measuring nutrient bioavailability in the human intestine.

(f) An increase of \$1,000,000 for work on new and improved methods for assessing nutritional status of individuals and populations. (\$1,000,000 available in 1980).

Need for Change. In fiscal year 1980, \$1,000,000 was provided for the operations of a western nutrition laboratory at the Letterman Army Institute of Research (LAIR) in San Francisco, California. With these funds, a limited research program involving approximately five scientists, will be initiated in 1980. This program will be aimed at the development of new and improved biochemical methods for the assessment of an individual's nutritional status using animal models for the initial methodology development.

The increase requested for 1981 will provide for a core program needed in developing methods for measurement of body composition, including anthropometric methodology for the determination of body water, body fat, bone mass, etc. This research knowledge is critical to improving capability for nutritional status assessment research program being initiated in FY 1980.

Nature of Change. The work will be carried out in the western nutrition laboratory, Letterman Army Institute of Research (LAIR) and carried out in part, under a cooperative agreement with the University of California. The research will emphasize the use of animal models.

(g) A decrease of \$63,000 from current funding for additional effort on the nutritional value of pork - Handbook No. 8. (\$263,000 available in 1980).

Need for Change: The special program on determining the nutrient value of pork is currently estimated to be on schedule. In 1980 an additional \$63,000 was provided in order to keep the program on a three-year completion schedule. The program is being continuously monitored and any possible changes which are identified to make the program more cost-effective are being adopted. Within the next few months a detailed assessment will be made of anticipated costs for the final phase. At this time, estimates in hand do not indicate a need for funds above the \$200,000 in the base budget.

Nature of Change: As the basic work on the nutritional value of pork for Handbook No. 8 goes into the final phase, some of the extra effort added in this program for 1980 will be closed out or absorbed by other food composition programs. Current work is being accomplished through the Nutrient Composition Laboratory and the Meat Science Laboratory at the Beltsville Research Center. Some of the meat science work is being handled extramurally.

(6) An increase of \$3,500,000 to retrofit existing Science and Education Administration facilities with life-cycle cost effective energy conservation measures.

Need for Change: The President's Energy Plan places conservation of energy resources and efficient usage of fuel as the cornerstones to the solution of the energy problem. As the largest single consumer of energy, the Federal Government is best able to effect appreciable savings as well as influence the actions of other users.

The objective of the President's plan is to significantly reduce the Federal Government's demand for nonrenewable energy resources such as oil and natural gas by implementing and maintaining effective conservation measures for the efficient use of these and other energy sources as outlined in the National Energy Conservation Policy Act (P.L. 95-619).

In compliance with Executive Order 12003 requiring a 20 percent reduction in energy consumption by 1985 and the National Energy Conservation Policy Act (P.L. 95-619), the Department will conduct an energy conservation retrofit study that shall identify those alterations, modifications or additions which could feasibly be implemented.

Nature of Change: The proposed Energy Retrofit Program consists of energy surveys, systems design, construction and modification of assigned space.

The energy survey will be a thorough study of approximately 2,906 buildings to identify potential energy savings and applicable retrofit measures in future fiscal years. Retrofit actions may include modification to the building, its equipment, plumbing, electrical or mechanical systems, operating and maintenance procedures.

The design portion of the program is reflective of the varied and complex modifications that will probably need to be effected within the SEA facilities. The energy systems include not just the structure and materials that comprise the facility but also; plumbing, heating, air

conditioning, electrical systems, and other mechanical systems within the building. After design, construction and/or modification of the facilities would be initiated. This constitutes the largest portion of the Retrofit program costs.

The Energy Retrofit Program will enable the upgrading of the energy efficiency of Federal facilities thus contributing to the goal of reducing the Nation's dependency on non-renewable energy resources and the attainment of a modern and efficient system of research facilities to advance agricultural research in all fields. It will reduce the need to divert program funds from ongoing program operations needed to accomplish essential agricultural research.

(7) A decrease of \$3,900,000 for nonrecurring construction authority.

Need for Change. The following construction items will be financed in FY 1980 and funding will not be required in FY 1981: headhouse/greenhouse complex to be constructed at Stillwater, OK, \$1,700,000; feedmill at El Reno, OK, \$1,000,000; and greenhouse at Fargo, ND, \$1,200,000.

STATUS OF PROGRAM

The Agricultural Research (AR) component of the Science and Education Administration is concerned with mission-oriented research to ensure an abundance of high-quality, nutritious, reasonably priced food and other agricultural products to meet domestic and world needs while maintaining environmental quality. AR uses coordinated, interdisciplinary approaches to conduct basic, applied, and developmental research in the fields of livestock, plants, soil-water-and-air resources, environmental quality, energy, processing, storage and distribution efficiency, food safety and quality, consumer service, and agriculturally related health hazards.

Research is conducted at more than 150 locations in the States, Puerto Rico, Virgin Islands, and several foreign countries. Much of the research is conducted in cooperation with the State agricultural experiment stations, other State and Federal agencies, and private institutions.

RESEARCH ON ANIMAL PRODUCTION

Current activities: Research is conducted to improve the efficiency of producing high quality animals and animal products through improved genetic and reproductive capacity, improved feeding and management practices, increased use of feed sources not eaten by man, improved design and use of equipment, and more efficient use of energy. The goals are also accomplished through preventing and controlling diseases caused by infectious microbes, parasites, insects, and other pests and by chemical and natural toxicants. It is important to note that greater emphasis to basic research approaches to help meet the long term objectives of this area of work are occurring. Basic research approaches to solving problems associated with shipping fever, predators, wastes, stress and swine abscesses are planned for FY 1981.

As the production of animals and animal products continues to increase in the United States and the world, new technology is needed to enable livestock producers to increase production and thus to assure a reliable supply of animal protein while, at the same time, reducing production costs. Special attention is being given to the physiology of reproduction and sperm preservation, the formulation of diets and development of management practices that will reduce energy use and conserve the environment, production practices that alter the composition of animal products for the benefit of consumers, agents which cause disease and the animal's response to disease agents, and fundamental research. Research is also being conducted to develop methods of controlling, through environmentally safe practices, pests and diseases which cause major economic losses or which are infectious for man.

Selected examples of recent progress:

Screwworm Adult Suppression System (SWASS): After more than 10 years of research, a method of attracting and killing adult screwworm flies has been developed. This system, based on an effective attractant, a feeding attractant, and an insecticide, is being used by the Animal and Plant Health Inspection Service (APHIS) in conjunction with sterile male screwworms in the screwworm eradication program.

Development of Imported Fire Ant Control. Initial testing of thousands of compounds has identified some that could be effective bait toxicants for large-area control of imported fire ants. Small-scale field tests have eliminated all but a few from consideration for practical development for use in the near future. One of these bait toxicants is under study in a cooperative research and development program between the USDA and American Cyanamid, the discoverer and producer of the compound. Small-scale field studies have led to

(1) encouraging results, (2) improved formulations, and (3) efficacy. Large-scale field trials along with evaluations of dosages and formulations are very promising.

Brucellosis Vaccination Vaccination of yearling heifers with greatly reduced dosages of Brucella abortus Strain 19 stimulated an immunity comparable to that achieved with standard dosages. The resistance of heifers vaccinated with 1/10,000 of the standard dosage was equal to or better than resistance stimulated with higher dosages, and the postvaccinal response was minimal. This provides further evidence that reduced vaccine dosages can stimulate a good immune response without interfering with subsequent diagnostic tests.

Improved Methane Generator Can Make Swine Enterprises Energy Self-Sufficient. A farm-sized methane generator was designed and is being tested on a 120-sow farrow-to-finish swine farm. Results indicate that sufficient methane can be produced to supply the electrical and heating requirements of the swine buildings, when using the manure from these buildings. Most of the fertilizer value is retained. The design and operating technologies that have been developed from this text will improve the performance of methane digesters.

Beef Cattle Types Characterized for Production Efficiency. More than 20 types of cattle varying widely in growth rate, mature size, milk production, and other traits have been evaluated in crossbred combinations. The evaluations include individual performance and efficiency of steers to slaughter and maternal performance of heifers through four calf crops. An extensive series of recent publications covering results of these studies provides information to aid cattlemen in identifying types best adapted to their feed, management, and marketing situations.

Synchronization of Estrus in Swine. An orally active progestogen, Regumate, appears to be highly effective for controlling the estrus of heat cycle in swine. This procedure involves feeding Regumate for 18 days. After withdrawal, over 90 percent of the gilts returned to estrus in 4 to 7 days. The use of this treatment will allow producers to schedule matings and farrowings in advance.

Development of Improved Bluetongue Virus Vaccine for Sheep. A killed-vaccine preparation for two of the four types of bluetongue virus in the U.S. has been prepared and experimentally tested in sheep. The vaccinated sheep were protected when challenged with the live virulent viruses of these two types of bluetongue. Work is continuing on development of bluetongue vaccines for both cattle and sheep.

Microencapsulation of Insecticides Reduces Frequency of Application. A new microencapsulation technique has been developed for use with insecticides. The technique extends the residual effect 3 to 5 times, with apparent reduced toxicity. The microencapsulated insecticide can be used as a spray or dip on animals. The technique has been primarily tested for tick control but may also prove to be effective for application of other insecticides. This new technology is especially beneficial for use on range cattle that must be corralled for spraying.

Use of a New Test in Diagnosis of African Swine Fever. A rapid, economical accurate test called the enzyme labeled immunosorption assay (ELISA) test has been adapted for detecting swine that have been infected with African Swine fever (ASF) virus. The test has been automated to the degree that several hundred samples can be screened daily. The test is sensitive to low levels of antibody and specific in its reaction. The ELISA test will be widely applied in those countries of the Western Hemisphere where ASF has occurred to determine the degree of infection and to monitor ASF eradication programs.

Field Evaluations of Biological Control Agents for Mosquito Control.

Laboratory and field studies with a commercial strain of a bacterium, called Bacillus thuringiensis israelensis, have shown this new biological control agent capable of controlling several types of pest and disease-carrying mosquitoes. Successful commercialization is anticipated for use against larval stages of mosquitoes.

Field releases of a mosquito predator after laboratory rearing indicate that it has potential for biological control. In a wooded area, predator females located 80 percent of the tree holes where mosquitoes bred and deposited eggs in these holes. Laboratory methods for producing the predator have been developed.

Exotic Species of Beetle Aids in the Biological Control of Manure-Breeding Insects. The fouling of pastures by feces of grazing animals is detrimental to pasture utilization. Recent establishment of the Afro-Asian beetle, Onthophagus gazella, in several areas of the United States has decreased the time cattle feces remain on the surface of pastures. Preliminary results show that 82-88 percent of deposits of cattle feces are buried within one week during peak activity months (July, August, September) of the beetle. The fertilizer content of cattle feces is considerable. Rapid burial of cattle feces by beetles alleviates the fouling problem and aids in conservation and reuse of the fertilizer elements in feces. Also, when feces are rapidly buried, the breeding habitat of horn flies and face flies is destroyed and the eggs of gastrointestinal parasites are removed from the pasture surface, thereby lowering the potential of parasitism in livestock.

Pseudorabies and Parvovirus Vaccines for Swine. A killed bivalent vaccine for pseudorabies virus (PRV) and one for porcine parvovirus (PPV) were developed for prevention of reproductive failure of swine caused by these viruses. Each vaccine was tested in eight pigs, and eight unvaccinated pigs were used for controls. Upon challenge, none of the vaccinated pigs had reproductive failures; whereas, five of eight unvaccinated pigs when challenged with parvo-virus had fetal deaths and mummification, and two of eight unvaccinated pregnant pigs aborted infected fetuses when challenged with pseudorabies virus.

Two New Approaches to Increasing Reproductive Efficiency in Cattle. Over 50 percent of the dairy cattle in the United States are bred by artificial insemination and many more would be if problems with detection of estrus could be eliminated. Insemination must take place at estrus (heat) because ovulation follows soon after. Detection of estrus requires careful observation of cattle. Over 50 percent of estruses are missed and cows are often inseminated when not in heat. The result of this reproductive inefficiency costs millions of dollars in terms of reduced efficiency of milk production. Studies have shown that cows are about four times more active at estrus, and their activity can be monitored by a simple device attached to a cow's leg. The findings have stimulated development of automatic electronic equipment by private

industry for use in detection of estrus on dairy farms. Other studies show that cows in estrus produce a specific odor that is not present at other times. Dogs can be trained to detect this odor. Chemical studies of the odorous material are being carried out. This research may lead to another practical approach to the problem of estrus detection.

Inexpensive Method of Blood Sampling Perfected and Field Tested. Blood samples for conducting laboratory diagnostic tests are usually taken with a syringe and needle and shipped frozen in plastic or glass tubes. In the new method, blood from a punctured vein is soaked up into a small piece of special blotting paper and dried. The identification of the animal is written on the paper in pencil. The sample can be placed in an envelope and mailed. At the laboratory, the samples are soaked out of the blotting paper and may be used in several tests for diagnosing different disease agents. A successful survey for exotic Newcastle disease in Puerto Rican poultry was conducted using this technique.

Selected Lines Show 47 Percent Gain in Weight of Lamb Weaned at 120 days. Two lines selected for twice a year lambing gave a 47 percent gain in weight of lamb over conventional-breed ewes; an average of 107 pounds of lamb per ewe at 120 days when given two opportunities to lamb each year. This compares with an average of 73 pounds of lamb weaned at 120 days from Rambouillet, Columbia, and Targhee ewes and 89 pounds of lamb from Polypay ewes lambing once per year, all under ordinary range conditions.

Feed and Lighting Energy Requirements for Broilers Reduced by Intermittent Lighting. Commercial broilers were reared under intermittent lighting that consisted of 15 minutes of light at 0.7 foot-candle followed by 105 minutes of darkness. A better feed conversion ratio was attained than with broilers reared under a daily regime of 12 hours of light at 22 foot-candles and 12 hours of light at 0.7 foot-candle. The test began after the broilers were 9 days old. Body weight gain remained the same for both treatments.

RESEARCH ON PLANT PRODUCTION

Current activities: Research is conducted to improve productivity, reliability and quality of food, feed, forage, and fiber crops; florist and nursery crops; rangelands; and turf. Similar work is being done which will be strengthened in FY 1981 in related areas of tropical and subtropical agriculture. The emphasis is on improved genetic stocks and varieties; which will be strengthened in FY 1981 by a change in research approach involving several ongoing studies; optimized yields and quality of crops; improved mechanization and crop production practices; enhanced environmental quality; improved integration of crop protection techniques, including biological and chemical methods of controlling diseases, nematodes, insects, and weeds, which will be strengthened in FY 1981 by changing the research approach of some ongoing crop production studies; and alleviation of the effects of drought and temperature stresses through the development of hardier plants.

New methods of increasing productive capacity through multidisciplinary approaches have been initiated. Special emphasis is being placed on improving basic photosynthetic processes in plants, natural nitrogen-fixing processes in soils and plants, better use-efficiency of both renewable and nonrenewable energy resources, and genetic and chemical regulation of plant growth and development processes. Basic research approaches to solving problems associated with potato diseases, chalk brood disease, soybean pollination, english walnuts, sugar cane production, dairy forage, quality of wheat, pickles, onions, and carrots, and various crop production studies will occur in FY 1981.

Selected examples of recent progress:

Plant Biochemists Make Breakthrough in the Understanding of Photorespiration - A Wasteful Plant Process. A major limiting factor in the productivity of all major crops except corn, sorghum, and sugar cane is photorespiration, a process that substantially reduces the use of atmospheric carbon dioxide with no apparent benefit to the plant. In a dramatic breakthrough toward the elimination of photorespiration, SEA-AR scientists at Urbana, Illinois, created plant strains in which photorespiration has become a lethal characteristic. These plants die when grown in normal air and survive only under artificial conditions where photorespiration cannot function. Subsequent generations of these genetically altered strains will be screened for survival ability in air. In such plants, a 50-percent increase will be realized in the efficiency of converting sunlight energy into biomass production and seed yield.

Citrus Blackfly is Now Under Control. State and Federal regulatory agencies report that the citrus blackfly is no longer a threat to commercial citrus because of the phenomenal success of beneficial parasites reared and introduced by SEA scientists. In Florida, a \$5 million per year chemical spray program has been canceled in favor of the biological control program.

Programs in Plant Disease and Insect Control in No-till. No-till farming results in a significant saving of energy and provides effective erosion control in the Pacific Northwest. We are approaching effective disease and insect control through use of resistant varieties, fungicides, and insecticides. Although weeds are still a serious problem, progress is being made to control weeds with herbicides in combination with some tillage.

Potent Attractant Isolated and Identified for Several Important Insect Pests. During the past year potent attractants were isolated, identified, and synthesized for the bollworm, tobacco budworm, white peach scale, armyworm, navel orangeworm, and Comstock mealybug. Some attractants are already in practical use to monitor wild populations of the pests.

Tifton 44 Bermudagrass Released. Tifton 44 bermudagrass, the best of several thousand F₁ hybrids between Coastal and a bermudagrass found in Berlin, Germany, was registered and released in 1978 by the Tifton, Georgia, location. Evaluation by USDA and State scientists from several disciplines in 14 States proved Tifton 44 to be equal to Coastal in disease resistance, yield, and adaptation; superior in winterhardiness and quality; and producing 19 percent better average daily gains when grazed or fed as pellets. Tifton 44 can be grown dependably in a belt 550-miles wide from the Atlantic coast to central Texas. Sprigs of Tifton 44 were distributed to 263 certified growers from central Texas to the Atlantic coast. A million acres can be planted in 1982. This acreage could add 50 million pounds more beef than would be available from a similar acreage of Coastal bermudagrass.

Basic Research Provides Basis for Improved Wild Oat Herbicide Performance.

Diclofop, a new herbicide, can control wild oat in wheat and other crops. However wild oat changes the herbicide when it is applied and lessens its effectiveness. Chemical inhibitors that prevent wild oat from making these undesirable changes have been developed. These inhibitors increase the effectiveness of the herbicide for controlling wild oat and make it possible to use less herbicide per acre with equal effectiveness. Diclofop is most effective in controlling wild oat when it is placed on the stems and lower parts of the weed. Field application techniques for better placement of diclofop-chemical inhibitor mixtures can mean better weed control, reduced costs, and greater environmental safety.

Productive Native Range - Complementary Forage Beef Production System Developed.

Hybrid cattle of Angus, Braham, and Hereford breeds coupled with hybrid forages (pearl millet for summer and wheat and rye pasture for winter and spring) gave an extra 200 to 250 pounds more gain per cow than straight bred cattle on native range at Woodward, Oklahoma. One acre of the farmed-forages and 11 acres of native range were used in this system compared with 17 acres of native range for a typical ranch operation.

Eradication of the Boll Weevil. Technology for use in eradicating the boll weevil, including mechanized rearing and sterility, attractants, and an insect-growth regulator, has been developed and successfully implemented in an eradication trial. The boll weevil has been essentially eradicated from a special test area of 750 acres for more than a year. In a large evaluation of 17,000 acres, where the eradication technology was applied a year after the 750-acre site, no reproduction of the boll weevil has been detected for several months. A comprehensive evaluation is being made to determine the feasibility of implementing a cotton beltwide eradication effort.

Basic Photosynthesis Research Explains Why Plants Are Tolerant to Herbicides.

More than half of all herbicides act by selectively inhibiting photosynthesis in plants, and this is the basis for their selectivity and killing action. Triazine herbicides, such as atrazine, are important examples of these photosynthetic inhibitors. Today, approximately 15 weed biotypes, have been identified as not controlled by the triazine herbicides. USDA-SEA scientists at Urbana, Illinois, studying basic photosynthesis processes, now understand the basis for such tolerance. They have shown that the herbicides do not bind to the chloroplast membranes in the tolerant weed biotypes. This is true for all the newly discovered tolerant weed biotypes. The Urbana group identified a specific protein in the chloroplast membrane that is different in the tolerant weeds. Their biochemical characterization of this protein is leading to a better understanding of the potential problem of spread of tolerance among weed biotypes. An understanding of these mechanisms will also enable scientists to develop crop varieties that are more tolerant of herbicides as well as develop better procedures for using herbicides.

Wild Bee Pollinators for Pome and Nut Crops and Red Clover Identified. Almonds, apples, and red clover are among the many fruit, nut, and seed crops that require cross-pollination, usually supplied by honey bees. Adequate pollination of these is often a problem for the following reasons: the first two crops usually bloom so early that weather is often unfavorable; and in red clover honey bees are not as effective as several species of wild bees that are rarely abundant enough. Management techniques for two species of Osmia, a genus of wild bees, are being developed to the point where commercial utilization is almost possible, thus offering an option to the use of honey bees. The blue orchard bee, O. lignaria, has already been successfully used to pollinate almonds in California and apples in Utah on a commercial scale. A species from Europe, the clover bee, O. coeruleascens, is an exciting candidate for pollinating red clover. Management techniques are being worked out that will permit the development and control of bee populations large enough to pollinate commercial fields of red clover.

Plant Exploration to Japan--Fall 1978. With support from the National Geographic Society, a group of scientists from the National Arboretum traveled to remote islands in the Japan Sea and collected over 800 living plants and 750 herbs. This trip greatly expanded our knowledge of the flora of Japan and will provide a broad array of germplasm of trees, shrubs, and other ornamental plants for American gardens.

Rope Wick Applicator Offers Greater Precision, Selectivity, and Lower Costs in Weed Control. A precision applicator was developed to apply herbicides to weeds growing above the crop plant canopy. Precise application of herbicides by the nylon rope wick reduces costs, minimizes drift and crop damage, conserves herbicide solution, and provides effective control of such perennial weeds as johnsongrass in soybeans and cotton, and horsetail and late eupatorium in grass pastures. Herbicide on the wick is replenished by capillary movement of herbicide solution from the reservoir. Sixteen manufacturers have expressed interest in making the device and have requested licenses to sell herbicide applicators based on disclosures of the U.S. Patent Application Serial No. 969,036, entitled "Rope Wick Applicator."

Experimental Chemical Increases Apple Fruit Set. A naturally occurring experimental chemical has been found to give a 75 to 150 percent increase in fruit set on Delicious apples in Wenatchee, Washington. Fall or spring treatments with aminoethoxyvinylglycine also increase flesh firmness of apples in storage and spur vigor and lateral branching of trees. This chemical, when further tested and cleared for commercial use, might help to reduce the problem of inconsistent bearing of the Delicious variety in eastern production areas.

A Disease Organism for Grasshopper Control Developed. Based on research and development by AR scientists, USDA and EPA have examined the potential registration of Nosema Locustae, a protozoan that causes a disease that will control grasshoppers on rangeland. After viewing AR's safety and efficacy data, EPA expressed interest in speeding up the registration of the product. AR research has shown that this disease will keep populations of grasshoppers below economic threshold levels if the chemical is applied before the grasshoppers have reached damaging numbers. Registration by a commercial producer is expected to be completed within the next few months.

Alfalfa Biological Nitrogen Fixation May Save Natural Gas to Heat Homes. A team of SEA-AR scientists are seeking alfalfas that have potentially superior nitrogen-fixation capacity in efforts to replace energy-expensive fertilizer in crop-production systems. Tests show that their experimental populations of alfalfa derived a greater proportion of nitrogen from symbiotic fixation than did a standard variety. One experimental population fixed 78 percent more nitrogen; and a second 18 percent more nitrogen, than the standard variety. Histological and biochemical studies revealed how the nitrogen-

fixation process regenerates after temporary reduction by plant harvest, and how nitrogen fixation is changed by the nitrogen being released by soil particles. Today, an annual alfalfa is being developed that will substitute for the normal perennial alfalfa as a "nitrogen fertilizer generator" in grain-cropping rotations. The potential impact of this research on energy resources, if only 10 percent of the Nation's corn crop was grown annually in rotation with alfalfa, the fertilizer nitrogen saved would reduce the demand for natural gas by 28 billion cubic feet. This quantity of gas would provide winter heat for 440,000 Minnesota homes.

Understanding the Transfer of Genetic Information from Bacteria to Plants. The interaction between the bacterium, Agrobacterium tumefaciens, and plants results in a natural form of genetic engineering. The first step in the interaction is the transfer of a small part of bacterial genetic material from the bacterium to the plant cell. Our results indicate that the genetic material is a message for structural gene functions. Some of these functions may be replaceable, allowing us to introduce in their place desirable genetic traits, such as the enhancement of seed protein quantity and quality, increased photosynthetic efficiency, and nitrogen fixation by nonlegumes.

Ten New High Yielding Soybean Varieties with Resistance of Diseases, Plant Lodging, Stress Environments, or Herbicide. Wells 11, Corsoy 79, Williams 79, and Beeson 80 soybeans were released to add phytophthora root rot resistance to previous Cornbelt releases. Other Cornbelt releases are Gnome, Will, Amcor, and Century. Gnome and Will offer improved lodging resistance for high yield environments. Amcor has relatively greater height and thus higher yielding ability in stress environments than shorter varieties. Century is superior in yield and resistance to lodging as compared with other varieties of comparable maturity and height. In the South, Tracy-M was released for tolerance to the herbicide metribuzin and Braxton was developed for resistance to root-knot nematodes.

New Citrus Hybrid Introduces. Sunburst, a new tangerine hybrid, has been introduced from the USDA citrus breeding program in Florida. It ripens earlier than existing commercial varieties and is more highly colored. The fruit will be used primarily for the fresh market, but because of its high juice color, Sunburst will also be used for juice blending. The trees are resistant to Alternaria disease.

Biological Control with an Insect Virus. A commercial firm recently dedicated a 25,000 sq. ft. plant to produce a virus to be used for biological control of the bollworm complex on cotton. The virus was discovered by USDA-AR scientists and developed for commercial use jointly with the private sector. An adjuvant, now being marketed by a commercial firm, that improves the effectiveness of the virus and other microbial agents also was developed by USDA-AR scientists.

Cost of Gypsy Moth Virus Reduced to less than Cost of Conventional Insecticides. Efficient procedures were developed for large-scale production of the gypsy moth virus, Gypchek. The cost of production excluding overhead, was reduced to no more than \$2.40 per acre treatment - or one-tenth of previous costs.

Corn Rootworm Parasite Successfully Reared in the Laboratory. Successful parasitism of the banded cucumber beetle larvae with a parasitic nematode has been accomplished in the laboratory. The parasites are now being produced in the laboratory with greater success, and improvements in rearing techniques are being devised. This work could open the way for developing a national biological control program against larvae of the banded cucumber beetle and corn rootworm complex as these insects cause millions of dollars in losses yearly to such crops as sweetpotato and corn.

Since no effective means are available of chemically controlling these pests, this parasite may have tremendous potential for protecting crops vital to our economy.

Diagnosis of Disease-Carrying Mites made Possible on Basis of Plant Galls.

Eriophyid mites are extremely small, and difficult to distinguish because of their size and scarcity of diagnostic features. Characteristic features of the plant galls they make have been discovered and this will permit their easy identification. Control measures, appropriate to the mite species can then be initiated to prevent spread of mosaic virus on corn, wheat, and barley. Appropriate control measures can also be applied against the mite species attacking fruit and nut trees, citrus, and ornamentals such as roses, lilies, and camellias by recognizing the galls.

Dramatic Increase in Use of Plant Germplasm. Over the last 3 years the annual distribution of plant germplasm to U.S. users has averaged about 280,000 units. Compared with a 3-year period of a decade ago, this represents nearly a tripling of demand for germplasm for crop-improvement programs. The increase reflects a greater awareness of the hazards of genetic vulnerability and the protection that can be afforded through genetic diversity in our crop varieties. It also reflects greater accessibility of plant germplasm provided through a stepped-up plant exploration and introduction program.

Reduced tillage enhances the growth of spring-planted crops and reduces energy requirements and soil erosion. Spring wheat and spring barley were grown successfully for two seasons with no-till planting. Crop yields were equal to or higher than on adjacent tilled seedbeds. The increased yield potential with no-till planting is a result of improved water conservation (soil and surface residues are not disturbed) and earlier planting (seedbed does not have to be prepared). Besides the potential for higher yield and energy conservation, no-till planting may allow for more spring cropping in the now traditional fallow areas. Less fallow would reduce tillage energy requirements, costs, and total soil erosion in these areas.

New Pima Cotton Variety Widely Grown in the Southwest. Pima S-5, jointly released by SEA-AR and the Arizona, New Mexico, and Texas Agricultural Experiment Stations, has been widely accepted by growers for its high yield and by textile mills for its superior fiber quality. It is currently grown on over 99 percent of the extra-long staple cotton acreage in the U.S. with a 1978 farm value exceeding \$45 million. Compared with older varieties, Pima S-5 yields more and matures earlier. It also has shorter plants that are better adapted to mechanical harvesting.

Research on Chemicals Expands Pesticide Uses Available to Growers. State and Federal scientists in the Minor Use Pesticide (IR-4) program have developed data for 2,387 individual ornamental uses and submitted them to chemical registrants for subsequent registration by the Environmental Protection Agency. Of the 67 tolerances to establish safe pesticide residue levels on food crops issued by EPA in 1979, 22 were issued to IR-4 to add 22 new crops on existing pesticide labels.

Regar Meadow Bromegrass Markedly Increased Irrigated Pasture Yields. An evaluation of 20 pasture mixtures at Bozeman, Montana, revealed that Regar Meadow bromegrass yielded 0.4 ton per acre more forage than any other grass when seeded in a grass-legume mixture under irrigation. This species is expected to make a major impact on forage production in the West's 5 million acres of irrigated pastures. Other species in order of declining yield were Manchar smooth bromegrass, Troy Kentucky bluegrass, and Chinook orchardgrass. Of the legumes studied, alfalfa contributed most and birdsfoot trefoil least to mixture yield.

New Strains of a Biocontrol Fungus to Improve Control of "Belly Rot", a disease of cucumbers. The fungus, Trichoderma harzianum is known to attack the soilborne fungus, Rhizoctonia, the organism that causes "belly rot" of cucumber. New strains of Trichoderma were selected that possess high ability to survive in the soil and tolerate high amounts of pesticides. Using these strains, at least 50 percent control of "belly rot" was obtained. Combining these antagonistic micro-organisms with conventional plowing (6-8 inches deep) to bury debris instead of the traditional disking (2-3 inches deep) reduced disease by more than 60 percent. This disease has become so serious in parts of the Southeast that cucumbers could not be grown without these techniques.

RESEARCH ON THE USE AND IMPROVEMENT OF SOIL, WATER, AND AIR

Current Activities: Research is conducted to improve the cropland, watershed, rangeland and noncultivated areas of the U. S. through development of sound resource management practices. Research deals with many aspects of the environment and covers a wide range of natural resource uses involving complex ecological systems. Much of the research is oriented to developing cultural practices and cropping systems that assure efficient use of soil, water, and air resources while providing adequate protection for sustained use. Investigations include reducing salt damage to soils, crops, and water; improving irrigation and drainage of agricultural land; developing tillage practices for improving soil properties and crop growth; managing and using precipitation and solar energy for crop production; reclaiming and revegetating land areas disturbed by man; utilizing, managing and conserving soil fertility for increased production and nutritional quality of plants and animals; preventing pollution of and improving the quality of soil, water, and air, controlling water erosion, wind erosion and sedimentation; and conserving and managing agricultural water resources. It is important to note that greater emphasis to basic research approaches to help meet the long-term objectives of this area of work are occurring.

Soil, water, and air research includes unique programs that serve needs relating directly to agriculture but also having wide application for nonagricultural purposes. Some of these programs include the study of remote sensing techniques for crop yield prediction; energy conservation and use, effect of climate extremes on crops, animals, and water needs; human and animal nutrition as influenced by chemical content of soil, water, and air; management of soils including disposal of waste from urban and agricultural sources; and improvement of water and air quality for rural communities. In FY 1981, additional emphasis toward the success of the AGRISTARS program is planned. The objective of this program is to provide for the use of aerospace technology and remotely sensed data to increase crop productivity

Selected examples of recent progress:

Can Crop Residues Be Used as a Source of Energy? With a renewed consciousness for conservation of soil and protection of water quality, the retention of residues on the soil surface became more important. Today, the question becomes how much residue can be removed for energy production without causing soil deterioration and environmental degradation. Scientists now have a partial answer. Fifty-six million tons of residues are available for removal in the Corn Belt. This is 36 percent of the residue produced in the region. Of those residues available for removal, two-thirds would come from relatively level, deep soils. Residue availability in the Great Plains is 18 million tons (considering wind erosion only) or 21 percent of the residues produced. Estimates of crop residue available for removal from other physiographic areas are being developed.

Agricultural Nonpoint Source Pollution Model Being Developed. A multidisciplinary team of scientists is developing a series of mathematical models that will predict the effect of agricultural land use on nonpoint source pollution. These models will integrate hydrological, erosion-sedimentation, and chemical components to predict both sediment and agricultural chemical transport. A field-scale model has been completed, and a report is being developed. Emphasis is now being placed on expanding the field-scale model to a watershed or basin scale. These models will be extremely useful to Section 208 planners and in the implementation of the Rural Clean Water Program.

Level-Basin Irrigation Improves Water and Energy-Use Efficiency. Irrigation and energy-use efficiency can be improved significantly in most irrigated areas. Level-basin irrigation, made practical by the adaptation of laser technology to land smoothing is resulting in irrigation efficiencies of 80 to 90 percent in the Welton-Mohawk Irrigation and Drainage District near Yuma, Arizona. Research engineers at Phoenix published Farmers' Bulletin 2261 entitled "Level-Basin Irrigation: A Method for Conserving Water and Labor." The level-basin concept is being adapted to the Grand Valley unit in Colorado to control salt leached by excessive irrigation from the underlying Mancos Shale. Automation is an essential feature of the level-basin system to enable accurate control of water and reduce labor that would otherwise be required. Automatic controls, including wires and tubes cast in the canal concrete, and flow-measuring devices developed largely at Phoenix, Fort Collins and Kimberly, have enabled efficient level-basin irrigation.

Aquatic Ecosystems Useful for Metabolic Research. Data on the fate of pesticides in the environment are necessary for registering pesticides and evaluating potential pollution hazards. Field scale data are costly to obtain, and small laboratory experiments may not be readily extrapolated to field conditions. A scaled-up version of a standard laboratory aquatic microecosystem was developed to obtain sufficiently large samples of sediment, water and aquatic organisms to determine the metabolic fate of pesticides in each of these components. Results with the herbicide trifluralin closely followed the known degradation pathways of the compound in sediment, water, and aquatic organisms. Results obtained were also comparable with those obtained in a pond under field conditions. This research has shown that a large laboratory microecosystem can be used to confirm, in one experiment, a wide range of environmental fate data usually obtained in a series of small laboratory experiments. It is a significant step in bridging the gap between laboratory and field studies.

Saline Seeps on Drylands of the Northern Great Plains Can be Controlled. Work at Fort Benton and Sidney has shown that saline seeps can be controlled by changing dryland cropping patterns. The sources of water causing these seeps can be eliminated by growing a deep-rooted crop with a high-water requirement in the rotation to extract soil water that has percolated beyond the root zone of shallow-rooted crops. Changing cropping systems to periodically include a deep-rooted crop eventually will correct the saline seep problem and increase crop production. Leaching under natural rainfall over a period of years will still be required before the saline areas can be reclaimed for economic crop production. Saline seep areas will continue to increase unless the present cropping systems are changed.

Modern Agriculture for Developing Countries. Researchers in Puerto Rico have used their research and others to help develop a comprehensive plan to modernize agriculture in Puerto Rico. The technology developed by these scientists is potentially transferrable to vast regions of the humid tropics. Incorporated into the plan are improvement and optimum use of the unique capabilities of various land areas and soils for production of needed agricultural products. The plan is being used to implement a government-sponsored program that will help return farmers to the land while allowing Puerto Rico to grow efficiently more of the agricultural products used by that country. Agricultural income during the year 1977-78 increased to \$504.6 million; \$37.5 million more than the previous year.

Effect of Environmental Stress on Plant Growth Can Now Be Predicted. We have long known that extremes of either temperature or water are detrimental to plant growth. Until now, we have had no way of predicting the influence these combined stresses have on yield reduction. SEA-AR scientists have overcome this deficiency by developing mathematical models in which both temperature and water extremes are combined. These new models allow better prediction of specific effects of environmental stress due to temperature and water on the growth and development of plants. Refinement of these models could eventually lead to a better annual assessment of world food production.

Field Manual for Research in Agricultural Hydrology. A multidisciplinary team of scientists published a watershed engineering agriculture handbook (224), describing in detail the experimental procedures required for initiating and maintaining hydrologic/water quality research projects. It also provides methodologies for obtaining the good cause and effect data needed for formulating policy decisions in water resources management and environmental quality control. Need for this research and data have been identified for several years as the highest priority need in water resources research and development.

A Tailwater Control System Reduces Erosion Sediment Loss from Irrigated Land. Erosion at the lower end of irrigated fields can produce as much as 5 to 25 tons per acre of sediment on slopes of less than 1 to 2 1/2 percent and much more on steeper slopes. A new tailwater-control system was developed to control this erosion and sediment loss. This consists of a buried pipe with standpipe inlets to replace the conventional open drainage ditch. Small sediment retention basins are formed by small earthen checks at each standpipe inlet, with the pipe inlets serving as outlets for the basin. Sediment is deposited in these basins. As a result, the lower ends of the fields, previously lowered by erosion, are built up again and erosion curtailed. Sediment losses are reduced 70 to 90 percent by the new system.

Detection of Cold Damage to Winter Wheat Seedlings. Data from field experiments were used to determine the relationships between air temperature, soil temperature, and survival rate of winter wheat seedlings. These relationships have been integrated into an automated system to allow the use of standard weather data to determine areas anywhere in the world where there is potential reduction in wheat production due to cold damage to winter wheat seedlings. This information can help the forecaster make more accurate and timely estimates of world wheat production.

PROCESSING, STORAGE, DISTRIBUTION,
FOOD SAFETY AND CONSUMER SERVICE RESEARCH

Current activities: Research is conducted to improve the efficiency of processing, storage, and distribution of food and agricultural products. The major emphasis is to maintain or improve agricultural product quality and reduce costs of marketing, processing, storage, and transportation through research and technology that would reduce losses from waste, spoilage and insect infestation, reduce energy requirements and pollution, optimize retention of nutrients and quality and insure product safety. It is important to note that greater emphasis to basic research approaches to help meet the long-term objectives of this area of work are occurring. Basic research approaches to solving problems associated with food quality, food processing, and marketing of horticultural crops are planned for FY 1981.

Research on problems of human health and safety are conducted and will be strengthened in FY 1981 by a change in research emphasis from the development and marketing of agricultural products to the problems of human health and safety. Studies develop means to insure that food and feed supplies and products are free from toxic or potentially dangerous residues, harmful chemicals, and microorganisms introduced from agricultural sources, or during processing operations. The research also includes studies of the means to control insect pests of man and his belongings; prevent transmission of animal diseases and parasites to man; reduce the hazards to human life resulting from pesticide residues, toxic molds, tobacco, and other causes; and develop technology for the detection and destruction of illicit growth of narcotic-producing plants.

Research is conducted on consumer services by studying family use of resources, by identifying budgeting problems of families and by providing information on fabric performance and the use and care of clothing and household articles by consumers.

Select examples of recent progress:

Development of a Rapid, Qualitative Scheme for Detecting Sulfa Drugs in Animal Feed. At the request of FSQS, scientists at ERRC developed a method to detect sulfa drugs in feed that is suitable for field work and can be performed in about 10 to 20 minutes by the average field worker. The equipment used is simple and inexpensive. Work is now underway to apply this method to animal tissues.

U. S. Hay Exports to Japan Resumed. Farmers' income in the Pacific Northwest increased \$2 million from shipments of timothy hay during the first 60 days of resumed exports. The sale of hay to Japan had been interrupted for a few years because of a quarantine placed on the product by the Japanese Government to prevent the introduction of the Hessian fly into Japan. Researchers developed a fumigation procedure using phosphine gas on baled hay in large shipping containers. Japan insect-quarantine scientists who witnessed the fumigation procedure and reviewed experimental data were convinced the treatment would be effective in protecting their agricultural production. The value of the hay export during the initial 60 day period alone exceeded by many times the cost of research to develop the fumigation treatment.

No-twist Process Reduces Cost of Making Natural Fiber Yarns. Novel techniques and equipment for producing no-twist cotton yarn are showing promise for significant reductions in cost of making yarns. Inserting twist is the major cost factor in conventional staple yarn manufacture. The no-twist technique avoids this high-cost operation by using a water-soluble adhesive to hold yarns together until woven or knotted, after which the adhesive is removed. Bursting strength and abrasion resistance of knit fabrics made with no-twist, all-cotton yarns are similar to fabrics from conventional ring-spun yarns. The experimental no-twist yarn technique has the potential for much higher production rates than either ring or open-end spinning technique and would result in substantial energy and labor savings.

Quality of Processing Potatoes Will Improve. The final content of sucrose in a potato at harvest is influenced by variety, planting date, growing location, soil fertility, cultural practices, and disease and environmental stresses during development. Screening of existing potato-breeding clones for low-sucrose potential, coupled with horticultural quality evaluation, has become an integral part of accelerating the selection of new, improved potatoes for processing. Processors, growers, and storers recently began to depend upon a sucrose-rating system developed to guide their harvesting, storage, and processing programs to achieve highest quality of the finished product.

New Method of Protecting Stored Farmer's Stock Peanuts Against Insects. The ASCS accepted a new insecticide (pirimiphos methyl) for the peanut industry to be used on the 1979 crop of farmers' stock peanuts in storage under loan. The application of the insecticide to the peanuts as they go into storage was approved by the Environmental Protection Agency under special permit. This protective treatment for peanuts was developed through laboratory and pilot-scale testing. The insecticide has low-level toxicity to warm-blooded animals and may be useful also in protective treatment of stored grains. It is effective against strains of insects that have developed resistance to malathion, which has been used for many years as a protectant for stored-agricultural products.

Inhibition of Fungal Growth While Drying Corn During Storage. Normally corn is force-dried with heat to reduce aflatoxin contamination. Researchers have succeeded in preventing aflatoxin formation in corn during the storage-drying process by trickling ammonia through the corn. At a cost of approximately 4 cents per bushel ammonia holds down mold and bacteria while the corn dries. This process precludes the use of conventional grain dryers and results in enough fuel savings to heat 100,000 homes per 1 billion bushels of corn.

Nonchemical Control of Stored-Grain Insects. An alternative to chemical control has been developed for use against insecticide-resistant moths that are serious pests of stored grains. The nonchemical method is bacterium, Bacillus thuringiensis, known to affect only insects. A commercial formula has been registered for use on stored grains. The formula is not hazardous to apply and tests show the treatment will remain effective for a long time. The toxicity of Bacillus thuringiensis to insects is not reduced by protectants or fumigants that may be applied to control the beetles that attack stored grains.

Test Tube System Developed for Studying the Mechanism of Ripening. The compound ethylene is known to be a major factor in the natural ripening process of fruits, vegetables and nuts. Basic understanding of the mechanism that controls ethylene production and inhibition has been limited by the inability to isolate the subcellular components, called protoplasts, known to produce ethylene. The discovery that high concentrations of calcium chloride are essential to the preparation of tissue protoplasts will now permit scientists to study intensively the ripening process, which is so important to food quality and prevention of food losses.

Technique for Use in Identifying Undeclared Meat in Cooked Sausage.

Detecting horsemeat in uncooked ground beef is not difficult. However, detecting undeclared meat types in cooked meat products, such as pork in an all-beef hot dog, has been impossible. Now, FSQS and other regulatory agencies can test meat for the presence of undelared origin meat in amounts as low as 10 percent in cooked sausage or other mixtures of cooked meats. This technique uses immunochemical test methods.

Broiler Handling Equipment Reduces Bird Losses and Injuries. Prototype cages for transporting up to 350 broilers were constructed and tested. Each unit of 350 birds will replace 24 conventional coops. The new cages are more easily loaded by bird handlers and reduce the injuries to broilers during transit and unloading. Companion equipment includes a conveyor for handling the cages, a cage-tilting device for automatic removal of the broilers, and a belt conveyor for moving the birds to the hanging station at the processing plant. Preliminary tests for this new system are very favorable.

Controlled-Release Pesticides. Research on the concept of controlled release (CR) of chemicals to improve the efficacy of weed control and reduce the impact of chemicals on nontarget organisms has resulted in successful field tests with selected CR formulations. Cooperating AR scientists at Beltsville, Purdue University, and the University of Illinois found that starch-encapsulated CR formulation or Treflan greatly reduced weed populations and extended the period of weed control over standard commercial formalations of this herbicide. The CR formulation also obviated the need for soil incorporation of the herbicide, a requirement with standard formulations due to volatility and susceptibility to photodecomposition. Tests with other herbicides and soil insecticides also revealed improved efficacy of pest control with starch-encapsulated pesticides because losses due to leaching and volatility are greatly reduced.

Making Potatoes Processable. Potato varieties vary widely in their physical structure and chemical composition, which often prevents their use in potato products and thereby restricts processing to specific parts of the Nation. Potatoes with high-solids content do not make good boilers to use in soups and stews because they fall apart; low-solids potatoes do not make good bakers or fryers because they lack the desired mealy characteristic. Scientists developed new principles of thermally controlling the desired texture and without using chemical additives. These principles have worked on almost all varieties tested and are now being applied by some processors outside the major processing areas using their own varieties. Processors report improvement in processability, reduction in losses, and consumer satisfaction in higher quality products.

Alternative Treatment of Chlorination. Recently, the safety of the chlorination treatment of wheat flours to produce high-performance cake flour has been questioned. Long-term animal studies showed no significant effects, and results have been submitted to FDA to review. Studies to develop alternative procedures to chlorination demonstrated that heat applied just before turbo-milling of wheat flour supplemented the frictional heat of the process and produced a flour with performance and eating quality equal to or better than chlorination.

Sequential Heat Peeling of Tomatoes Improves Productivity. Peel losses in the processing of canned tomatoes range up to 30 percent. USDA researchers have developed a technique called sequential heat peeling that could reduce this loss to about 5 percent for some varieties. A laboratory system was used to test the process on numerous varieties supplied by plant breeders. As a result of this screening process, some new varieties that are amenable to the new technique will be released for commercial production. Breeding efforts will be oriented to chemical-free peeling quality in the future.

Increased Natural Rubber Yield in Guayule. Results of earlier studies on chemical induction of increased rubber content in guayule were broadened to include treatment of older plants (18 months). At least a two-fold increase in rubber content was seen. Such increased rubber yields should help lead to a commercially viable domestic source of natural rubber to supplement the 719,000 tons imported yearly at a cost of over \$500 million.

HUMAN NUTRITION

Current Activities: Ways in which diet alone and in association with other factors, can delay or prevent the onset of degenerative conditions commonly associated with the aging process are areas of investigation. This includes work on the relationship of osteoporosis to diet, on iron deficiency anemia in the elderly, and on the relationship of nutrition to resistance to infection during aging. Attempts are also made to identify nutrient requirements, and ways in which an optimal diet, in combination with other factors (heredity, constitutional, psychological, sociological, and environmental) may contribute to health and vigor over a whole life span. Special attention is given to various aspects of nutrient content of food and the availability of these nutrients for use by the person consuming them. This includes research on nutrient quality of foods, biological processes that influence availability of nutrients from food and better approaches to the assessment of nutrient availability to humans. Assessment of the food intake of U. S. families and studies on nutritional status assessment are also included. New information about people's nutrition needs is immediately applied in many ways, such as, setting nutritional standards for Government programs and in developing guidelines to help people know what foods to eat to meet their nutrition needs. Current users of information resulting from research and education programs include individual consumers, consumer groups, medical and dietetic personnel, and government agencies such as the Federal Trade Commission, the Food and Drug Administration, and the Food and Nutrition Service of the USDA.

Selected Examples of Recent Progress

Three Revised Sections of Agriculture Handbook No. 8, "Composition of Foods--Raw, Processed, Prepared", Published. Revised sections No. 8-3 "Baby Foods," No. 8-4, "Fats and Oils," and No. 8-5, "Poultry Products," were published. The number of items in each section was greatly expanded over the 1963 handbook. The nutrient content of baby foods show the significant reduction in added sugar and salt as compared with the 1963 values. Items in the Fats and Oils section include values for total vitamin E, alpha tocopherol, total plant sterols, and cholesterol. The data for chickens in the revised Poultry Products section show the higher fat content now prevailing.

Food...USDA's New Approach to Dietary Guidance. FOOD, a new publication, gives consumers up-to-date, reliable information about food and nutrition and suggestions on how to apply this information to food decisions. FOOD is USDA's first full-color publication in magazine format designed to be competitive with commercial and other sources of consumer information on nutrition and foods.

Practices Used for Home Canning of Fruits and Vegetables at Home. Home Economics Research Report No. 43 was issued April 1979. Information is given about procedures, equipment, sources of instruction, and food spoilage encountered by home canners. According to the survey, one in three American families canned fruits and vegetables at home, many of them using questionable procedures contrary to USDA recommendations. Most home canners seemed to be aware of signs of spoilage in canned foods--bulging lids, leaks, spurting liquids when container is opened, off-odors, and mold; however, many were unaware that deadly botulinum toxin may be present in improperly canned foods without any visible signs of spoilage. About a fourth of those surveyed reported spoilage in home-canned fruits and vegetables. The results of this survey point out the need for safe, reliable home-canning instructions for home canners. SEA provides such instructions in four Home and Garden Bulletins on home canning, but the need for increased dissemination of these instructions is clearly evident.

USDA-HEW Joint Nutritional Guidelines. The first comprehensive reordering of Federal dietary guidance objectives since World War II will be issued later this winter. This is expected to have far-reaching consequences for Federal food and nutrition programs in the decade ahead.

Stable Isotope Method for Measuring Chromium. The development of an extremely sensitive method for measuring chromin in biological samples has permitted the demonstration that human urinary chromium excretion is much lower than previously thought, regarding dietary requirements, status, and bioavailability of chromium.

Sucrose Consumption by Carbohydrate-Sensitive Individuals. A human study has shown that in the portion of the United States population described as carbohydrate-sensitive (at least 20 million Americans), a reduction in the present level of sucrose consumption (15-20 percent of calories) reduced risk factors associated with both heart disease and diabetes. These results support the contention that modifications of diet can improve the health and well-being of the American people.

High-Protein and phosphorus Diets Alter Bones in Rats. Weanling rats fed diets high in protein or phosphorus had bones that were heavier and contained more phosphorus. However, young adult rats fed diets high in protein showed changes in bone suggestive of osteoporosis. Although all rats were in positive calcium and phosphorus balance, bones from young adult rats fed high dietary protein broke easier and were reduced in weight and phosphorus content. These animal studies may indicate that high consumption of protein in the U. S. may be advantageous for children and adolescents but also may contribute to the occurrence of osteoporosis in adult humans.

Methods Developed to Track the Fate of Dietary Lipids. Scientists have developed a new technique to simultaneously track three different dietary fats through the bloodstream. This technique will allow determination of the nutritional consequences of various fats and oils in the diet.

Mechanical Deboning of Poultry Meat Does not Increase Metabolic Disorders in Gout-Prone Individuals. Scientists at Athens, Georgia, determined that mechanically deboning of poultry meat did not significantly increase total uric acids and therefore pose no particular risk to gout-prone individuals.

CONTINGENCY RESEARCH FUND

The Contingency Research Fund, established by Congress in fiscal year 1962, is designed to provide a ready source of funds to meet unforeseen and immediate research needs. Releases from the fund are generally made in situations where an emergency exists, or for special needs such as an unexpected scientific "breakthrough," or for new diseases or pest problems where it appears inadvisable to wait for consideration of a request for funds for the project in the regular budget process. In allocating funds, the procedure ordinarily is to make no commitments for allocations from the fund beyond the current year.

Animal Production Efficiency Research:

1979 Obligations

Arbovirus Laboratory Safety	\$ 37,000
Production of Africian swine fever diagnostic reagent	23,600
Evaluation of the Screwworm Adult Suppression System (SWASS)	120,000
Research support to provide biological and ecological knowledge of indigenous natural enemies of Mediterranean Fruit Fly in Central America	65,000
Genetic differences among screwworm populations	60,000

Crop Production Efficiency Research:

Inhibition of chitin synthesis in insects	55,000
Verticillium wilt research - Alfalfa	75,000
Repairs to greenhouse damaged by fire	16,800

Processing, Storage, Distribution Efficiency Research:

Metabolic fate of cholesterol alphoxide	35,000
Effect of stress on altatoxin development in preharvest corn	77,600
Chronic effects of trypsin inhibitor in processed soy protein food products	100,000
Facility modifications and equipment for nitrite and botulism hazard research	300,000

Research on Conservation and Watershed:

Emergency evaluation of source ground water salt intrusion problems in the southwest	35,000
Total, 1979 Obligations, Contingency Research Fund	<u>1,000,000</u>

STATEMENT OF OBLIGATIONS AND STAFF-YEARS

BY LOCATION

Location	Actual 1979		Estimated 1980		Estimated 1981	
	Dollars	Staff-Years	Dollars	Staff-Years	Dollars	Staff-Years
ALABAMA, Auburn.....	1,775,524	59	1,760,300	58	1,965,900	58
ALASKA, Palmer.....	495,150	8	521,400	8	539,600	8
ARIZONA						
Phoenix.....	3,239,169	110	3,569,000	110	3,801,800	110
Tucson.....	2,692,257	88	2,935,100	88	3,247,700	88
Total.....	5,931,426	198	6,504,100	198	7,049,500	198
ARKANSAS, Stuttgart....	115,307	2	157,900	2	163,000	2
CALIFORNIA						
Albany.....	17,780,703	396	16,556,900	396	16,623,100	390
Brawley.....	671,696	26	660,400	25	689,200	25
Davis.....	823,483	16	1,366,100	16	1,452,300	16
Fresno.....	2,167,119	63	2,190,000	63	2,285,600	63
Indio.....	356,979	13	336,100	12	350,900	12
Pasadena.....	719,072	19	681,800	18	752,900	18
Riverside.....	1,910,446	58	1,938,800	58	2,022,800	58
Salinas.....	2,061,110	33	1,184,000	33	1,233,400	33
San Francisco.....	--	--	860,000	4	1,741,900	4
Shafter.....	681,562	21	687,000	21	716,400	21
Total.....	27,172,170	645	26,461,100	646	27,868,500	640
COLORADO						
Akron.....	418,077	9	421,300	9	437,600	9
Denver.....	1,408,343	42	1,418,900	42	1,737,400	42
Fort Collins.....	3,710,591	101	3,522,700	101	3,842,200	101
Total.....	5,537,011	152	5,362,900	152	6,017,200	152
DISTRICT OF COLUMBIA						
Program Headquarters						
Agency Management Services.....	2,271,105	81	1,987,800	81	2,051,400	81
Centrally Financed Program.....	14,184,661	656	25,914,500	689	28,048,100	689
Subtotal.....	9,793,610	8	13,895,800	8	15,185,100	8
Total.....	23,978,271	664	39,810,300	697	43,233,200	697
DELAWARE						
Georgetown.....	331,483	9	280,700	8	292,900	8
Newark.....	384,770	14	380,400	14	439,900	14
Total.....	716,253	23	661,100	22	732,800	22
FLORIDA						
Belle Glade.....	174,858	5	284,600	5	295,100	5
Bradenton.....	49,089	1	44,400	1	46,100	1
Brooksville.....	181,131	3	212,700	3	220,400	3
Canal Point.....	515,615	21	708,000	21	735,500	21

STATEMENT OF OBLIGATIONS AND STAFF-YEARS

BY LOCATION

Location	Actual 1979		Estimated 1980		Estimated 1981	
	Dollars	Staff-Years	Dollars	Staff-Years	Dollars	Staff-Years
FLORIDA (continued)						
Fort Lauderdale.....	112,513	3	364,800	3	375,600	3
Gainesville.....	5,326,651	142	5,670,300	142	6,280,200	142
Lake Alfred.....	115,022	4	118,200	4	123,500	4
Miami.....	701,219	30	691,400	29	723,800	29
Orlando.....	2,107,668	73	2,213,500	73	2,312,500	73
Winter Haven.....	676,942	20	635,800	19	663,400	19
Total.....	9,960,708	302	10,943,700	300	11,776,100	300
GEORGIA						
Athens.....	6,822,575	239	7,415,500	218	7,908,900	218
Byron.....	1,446,745	58	1,440,900	58	1,505,500	58
Dawson.....	628,638	20	630,100	20	659,900	20
Experiment.....	241,157	5	418,400	5	432,900	5
Savannah.....	1,983,147	69	1,928,600	68	2,015,900	68
Tifton.....	3,472,985	110	4,917,700	110	5,118,800	110
Watkinsville.....	1,069,414	37	1,238,000	37	1,291,100	37
Total.....	15,664,661	538	17,989,200	516	18,933,000	516
HAWAII						
Hilo.....	473,221	14	607,600	14	630,900	14
Honolulu.....	925,782	34	1,119,000	34	1,209,800	34
Total.....	1,399,003	48	1,726,600	48	1,840,700	48
IDAHO						
Aberdeen.....	307,832	7	312,600	7	325,000	7
Boise.....	561,465	17	631,200	17	699,200	17
Dubois.....	904,436	18	997,500	18	1,032,800	18
Kimberly (Twin Falls)	1,470,522	46	1,520,700	46	1,588,500	46
Total.....	3,244,255	88	3,462,000	88	3,645,500	88
ILLINOIS						
Chicago.....	109,208	3	146,600	3	152,600	3
Peoria.....	16,482,409	454	15,652,600	410	15,211,800	403
Urbana.....	2,290,760	49	2,244,200	48	2,414,700	48
Total.....	18,882,377	506	18,043,400	461	17,779,100	454
INDIANA						
Lafayette.....	1,633,337	34	1,861,100	34	1,926,700	34
Vineennes.....	301,028	11	261,000	10	274,000	10
Total.....	1,934,365	45	2,122,100	44	2,200,700	44
IOWA						
Ames.....	10,741,911	333	11,310,000	257	11,383,700	257
Ankeny.....	379,190	10	364,200	9	378,500	9
Total.....	11,121,101	343	11,674,200	266	11,762,200	266
KANSAS, Manhattan.....	2,769,535	73	2,791,100	73	2,903,900	73
KENTUCKY, Lexington.....	733,032	24	809,900	24	409,500	9

STATEMENT OF OBLIGATIONS AND STAFF-YEARS

BY LOCATION

Location	Actual 1979		Estimated 1980		Estimated 1981	
	Dollars	Staff-Years	Dollars	Staff-Years	Dollars	Staff-Years
LOUISIANA						
Baton Rouge.....	1,136,735	41	1,259,200	41	1,314,000	41
Crowley.....	116,123	5	129,300	5	135,500	5
Houma.....	1,340,046	29	1,229,200	28	978,700	28
Jeanerette.....	38,694	1	21,300	1	22,400	1
Lake Charles.....	301,035	7	332,700	7	345,200	7
New Orleans.....	16,803,973	452	17,887,500	419	18,516,700	413
Total.....	19,736,606	535	20,859,200	501	21,312,500	495
MAINE, Orono.....	378,647	11	360,400	10	312,900	10
MARYLAND						
Beltsville.....	56,530,406	1,581	53,549,600	1523	58,105,800	1475
Frederick.....	1,524,552	42	1,632,100	42	1,742,000	42
Glenn Dale.....	289,592	11	294,600	11	306,600	11
Hyattsville.....	4,537,719	89	7,111,500	89	7,776,200	89
Total.....	62,882,269	1,723	62,587,800	1665	67,930,600	1617
MASSACHUSETTS						
Boston.....	691,600	--	1,720,000	2	3,227,500	2
Otis AFB.....	103,819	3	196,500	3	203,200	3
Total.....	795,419	3	1,916,500	5	3,430,700	5
MICHIGAN, East Lansing	2,464,390	67	2,474,900	67	2,576,300	67
MINNESOTA						
East Grand Forks.....	305,661	9	319,200	9	332,400	9
Minneapolis.....	160,240	4	167,000	4	173,500	4
Morris.....	1,134,153	35	1,130,000	34	1,177,500	34
St. Paul.....	1,677,147	39	1,827,700	39	1,896,600	39
Total.....	3,277,201	87	3,443,900	86	3,580,000	86
MISSISSIPPI						
Gulfport.....	226,240	9	257,400	9	269,100	9
Meridian.....	298,483	12	334,100	12	349,500	12
Oxford.....	1,723,355	56	1,894,800	56	1,974,700	56
Poplarville.....	170,504	4	108,400	3	112,900	3
Mississippi State.....	3,485,641	89	3,548,000	89	3,694,300	89
Stoneville.....	4,935,107	186	5,169,500	177	5,509,100	177
Total.....	10,839,330	356	11,312,200	346	11,909,600	346
MISSOURI, Columbia.....	2,919,385	86	3,403,200	86	3,626,000	86
MONTANA						
Bozeman.....	560,865	16	579,800	16	733,200	16
Miles City.....	1,076,314	12	970,500	11	997,300	11
Sidney.....	866,741	28	809,100	27	846,800	27
Total.....	2,503,920	56	2,359,400	54	2,577,300	54

STATEMENT OF OBLIGATIONS AND STAFF-YEARS

BY LOCATION

Location	Actual 1979		Estimated 1980		Estimated 1981	
	Dollars	Staff-Years	Dollars	Staff-Years	Dollars	Staff-Years
NEBRASKA						
Clay Center.....	5,067,822	57	5,297,800	57	5,884,100	57
Lincoln.....	1,674,532	34	1,904,000	34	2,014,800	34
Total.....	6,742,354	91	7,201,800	91	7,898,900	91
NEVADA, Reno.....	564,828	14	575,400	14	599,000	14
NEW JERSEY, New Brunswick.....	346,132	10	375,500	10	390,100	10
NEW MEXICO, Las Cruces	1,017,396	32	931,100	31	972,500	31
NEW YORK						
Geneva.....	145,108	4	179,100	4	186,500	4
Ithaca.....	2,540,103	41	2,172,800	40	2,381,000	40
Plum Island.....	9,787,835	342	9,774,100	285	10,434,800	285
Total.....	12,473,046	387	12,126,000	329	13,002,300	329
NORTH CAROLINA						
Oxford.....	1,042,735	31	1,012,400	30	989,500	30
Raleigh.....	3,794,072	59	3,141,300	58	3,218,800	58
Total.....	4,836,807	90	4,153,700	88	4,208,300	88
NORTH DAKOTA						
Fargo.....	5,812,625	124	4,802,400	123	5,294,400	123
Grand Forks.....	2,099,081	32	2,058,400	32	2,343,300	32
Mandan.....	1,669,058	51	1,666,000	50	1,738,600	50
Total.....	9,580,764	207	8,526,800	205	9,376,300	205
OHIO						
Columbus.....	147,559	5	176,100	5	183,500	5
Coshocton.....	659,378	16	648,700	15	673,700	15
Delaware.....	526,449	14	531,400	14	552,300	14
Wooster.....	1,448,886	39	1,174,000	38	1,226,700	38
Total.....	2,782,272	74	2,530,200	72	2,636,200	72
OKLAHOMA						
Chickasha.....	763,035	24	--	--	--	--
Durant.....	577,144	24	1,517,500	48	1,581,100	48
El Reno.....	1,069,936	13	732,300	12	758,100	12
Stillwater.....	1,131,686	24	979,700	23	1,018,200	23
Woodward.....	508,965	17	448,400	16	468,900	16
Total.....	4,050,766	102	3,677,900	99	3,826,300	99

STATEMENT OF OBLIGATIONS AND STAFF-YEARS

BY LOCATION

Location	Actual 1979		Estimated 1980		Estimated 1981	
	Dollars	Staff-Years	Dollars	Staff-Years	Dollars	Staff-Years
OREGON						
Burns.....	143,530	1	210,400	1	216,800	1
Corvallis.....	2,097,055	45	1,620,800	44	1,880,400	44
Pendleton.....	650,521	18	702,700	18	730,100	18
Total.....	2,891,106	64	2,533,900	63	2,827,300	63
PENNSLYVANIA						
University Park....	2,075,748	52	1,991,500	51	2,070,300	51
Wyndmoor.....	10,442,525	305	9,934,500	269	10,125,100	263
Total.....	12,518,273	357	11,926,000	320	12,195,400	314
SOUTH CAROLINA						
Charleston.....	1,293,485	39	1,008,000	38	1,097,800	38
Clemson.....	1,207,858	40	1,211,900	40	1,264,900	40
Florence.....	1,230,822	36	1,263,600	36	1,316,700	36
Total.....	3,732,165	115	3,483,500	114	3,679,400	114
SOUTH DAKOTA,						
Brookings-Madison...	1,879,629	37	1,247,000	36	1,298,500	36
TENNESSEE						
Greenville.....	133,954	4	148,600	4	--	--
Jackson.....	92,613	3	108,500	3	113,600	3
Knoxville.....	793,162	26	506,200	13	526,400	13
Lewisburg.....	100,753	4	109,100	4	114,200	4
Total.....	1,120,482	37	872,400	24	754,200	20
TEXAS						
Beaumont.....	396,218	15	422,000	15	440,700	15
Big Spring.....	168,139	6	--	--	--	--
Brownsville.....	1,469,054	38	1,109,600	37	1,157,200	37
Brownwood.....	384,097	11	368,500	10	384,100	10
Bushland.....	1,318,725	35	1,691,100	38	1,756,000	38
College Station....	5,087,812	172	5,048,300	171	5,604,100	171
El Paso.....	43,859	1	--	--	--	--
Houston.....	1,294,071	--	2,238,500	2	2,724,600	2
Kerrville.....	1,655,349	66	1,917,900	66	2,168,100	66
Lubbock.....	812,127	24	1,099,800	30	1,143,500	30
Mission.....	766,034	22	805,000	22	836,700	22
Temple.....	1,608,303	43	1,786,900	43	1,942,000	43
Vernon (Chillicothe)	64,486	3	--	--	--	--
Weslaco.....	3,113,673	108	3,424,800	108	3,610,700	108
Total.....	18,181,947	544	19,912,400	542	21,767,700	542
UTAH, Logan.....	2,037,023	57	2,078,700	57	2,337,000	57

STATEMENT OF OBLIGATIONS AND STAFF-YEARS

BY LOCATION

Location	Actual 1979		Estimated 1980		Estimated 1981	
	Dollars	Staff-Years	Dollars	Staff-Years	Dollars	Staff-Years
VIRGINIA						
Blacksburg.....	76,721	3	66,600	2	70,000	2
Richmond.....	151,150	5	151,100	5	--	--
Suffolk (Holland)...	344,453	12	378,200	12	395,300	12
Total.....	572,324	20	595,900	19	465,300	14
WASHINGTON						
Prosser.....	1,294,024	39	1,282,100	38	1,423,500	38
Pullman.....	2,080,579	68	2,162,900	68	2,256,600	68
Wenatchee.....	1,053,855	25	881,200	24	917,200	24
Yakima.....	1,521,526	50	1,309,100	49	1,408,100	49
Total.....	5,949,984	182	5,635,300	179	6,005,400	179
WEST VIRGINIA						
Kearneysville.....	778,177	5	1,226,000	5	1,268,800	5
Morgantown.....	482,278	12	617,400	12	642,100	12
Total.....	1,260,455	17	1,843,400	17	1,910,900	17
WISCONSIN, Madison....	1,834,568	39	2,527,600	44	3,011,800	44
WYOMING						
Cheyenne.....	533,101	17	661,500	17	689,700	17
Laramie.....	299,816	11	333,200	11	347,900	11
Total.....	832,917	28	994,700	28	1,037,600	28
PUERTO RICO						
Mayaguez.....	791,898	38	839,400	38	883,800	38
Rio Piedras.....	315,962	8	328,900	8	341,700	8
Total.....	1,107,860	46	1,168,300	46	1,225,500	46
VIRGIN ISLANDS, St. Croix.....	252,634	12	322,300	12	336,800	12
OTHER COUNTRIES						
Argentina.....	85,105	--	78,300	1	80,800	1
El Salvador.....	47,128	1	--	--	--	--
France, Paris.....	353,666	2	387,000	2	397,800	2
Italy, Rome.....	231,162	2	232,500	2	239,500	2
Japan.....	97,757	1	67,700	1	70,000	1
Kenya.....	113,839	1	112,900	1	116,300	1
Netherlands, Rotterdam.....	262,774	2	265,000	2	272,800	2
Thailand.....	68,976	1	71,900	1	74,300	1
Total.....	1,260,407	10	1,215,300	10	1,251,500	10

STATEMENT OF OBLIGATIONS AND STAFF-YEARS

BY LOCATION

Location	Actual 1979		Estimated 1980		Estimated 1981	
	Dollars	Staff-Years	Dollars	Staff-Years	Dollars	Staff-Years
Program locations to be determined.....	--	--	7,364,300	--	8,492,100	--
Contingency Research Fund.....	-- <u>1/</u>	--	1,000,000	--	1,000,000	--
Construction of Facilities.....	--	--	3,900,000	--	--	--
Repair and Maintenance of Facilities and Equipment.....	-- <u>2/</u>	--	8,216,000	--	11,716,000	--
Unobligated Balance...	6,846,142	--	--	--	--	--
Subtotal, Available or Estimate.....	344,170.702	9,295	378,442,000	8,954	402,350,000	8,857
Allotment to: Forest Service.....	303,298	2	386,000	4	389,000	4
Total, Available or Estimated.....	344,474,000	9,297	378,828,000	8,958	402,739,000	8,861

1/ Obligations for the \$1,000,000 appropriation in 1979 are included in the projects above.

2/ Obligations for the \$8,216,000 appropriation in 1979 are included in the projects above.

3/ Excludes reappropriation of \$2,000,000 of prior year funds for additional labor, subprofessional and junior scientific help in the field.

11

SCIENCE AND EDUCATION ADMINISTRATION
COOPERATIVE RESEARCH

Purpose Statement

Cooperative Research participates in a nationwide system of research program planning and coordination between the States and the U. S. Department of Agriculture which encourages and assists in the establishment and maintenance of cooperation within and among the States and between the States and their Federal research partners. The primary function is the administration of Acts of Congress that authorize Federal appropriations for agricultural research carried on by the State agricultural experiment stations of the 50 States, Puerto Rico, Guam, the Virgin Islands, and the District of Columbia; by approved schools of forestry; the 1890 land-grant institutions and Tuskegee Institute; colleges of veterinary medicine; and other eligible institutions.

Administration of payments and grants involves the approval in advance of each individual research proposal submitted by a State agricultural experiment station or other institution to be financed in whole or in part from Federal grant funds and the disbursement of the funds. The research programs and expenditures are continuously reviewed and evaluated.

The program coordination and planning is carried out by a Cooperative Research staff located entirely in Washington, D. C. As of September 30, 1979, there were 88 full-time permanent employees and 8 other than permanent employees.

SCIENCE AND EDUCATION ADMINISTRATION

The estimates include appropriation language for this item as follows (new language underscored; deleted matter enclosed in brackets):

Cooperative Research

For payments to agricultural experiment stations, for cooperative forestry and other research, for facilities, and for other expenses, including [\$118,566,000] \$125,778,000 to carry into effect the provisions of the Hatch Act, approved March 2, 1887, as amended by the Act approved August 11, 1955 (7 U.S.C. 361a-361i), and further amended by Public Law 92-318 approved June 23, 1972, and further amended by Public Law 93-471 approved October 26, 1974, including administration by the United States Department of Agriculture, and penalty mail costs of agricultural experiment stations under section 6 of the Hatch Act of 1887, as amended; [\$10,000,000] \$10,606,000 for grants for cooperative forestry research under the Act approved October 10, 1962 (16 U.S.C. 582a--582a-7), as amended by Public Law 92-318 approved June 23, 1972, including administrative expenses; [\$17,785,000] \$18,867,000 for payments to the 1890 land-grant colleges, including Tuskegee Institute, for research under section 1445 of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (Public Law 95-113), as amended, including administration by the United States Department of Agriculture, and penalty mail costs of the 1890 land-grant colleges, including Tuskegee Institute;

1 [\$1,500,000 for Rural Development Research as authorized under the Rural Development Act of 1972, as amended (7 U.S.C. 2661-2668), including administrative expenses; \$32,548,000] \$39,660,000 for contracts and grants for agricultural research under the Act of August 4, 1965, as amended (7 U.S.C. 450i), of which [\$16,548,000] \$14,660,000 is for special research grants, and [\$16,000,000] \$25,000,000 is for competitive research grants, including administrative expenses; \$500,000 for grants in accordance with section 1419 of Public Law 95-113; \$650,000 for research authorized by the Native Latex Commercialization and Economic Development Act of 1978;

2 [\$6,000,000 for the support of animal health and disease programs authorized by section 1433 of Public Law 95-113; including administrative expenses;] and [\$1,496,000] \$1,712,000 for necessary expenses of Cooperative Research activities, including administration of payments to State agricultural experiment stations, funds for employment pursuant to the second sentence of section 706(a) of the Organic Act of 1944 (7 U.S.C. 2225), and not to exceed \$50,000 for employment under 5 U.S.C. 3109; in all, [\$189,045,000] \$197,773,000.

The first change is for the purpose of deleting language which provides for Rural Development Research under Title V of the Rural Development Act of 1972. No funding is proposed for Rural Development Research under Title V in fiscal year 1981.

The second change is for the purpose of deleting language which provides for animal health and disease programs authorized by section 1433 of Public Law 95-113. No funding is proposed for this program in fiscal year 1981.

COOPERATIVE RESEARCH

Appropriation Act, 1980.....	\$189,045,000
Budget Estimate, 1981.....	<u>197,773,000</u>
Increase in Appropriation.....	<u>+8,728,000</u>

SUMMARY OF INCREASES AND DECREASES

<u>Item of Change</u>	<u>1980 Estimated</u>	<u>Program Changes</u>	<u>1981 Estimated</u>
Payments under the Hatch Act..	\$118,566,000	+\$7,212,000	\$125,778,000
Cooperative forestry research.	10,000,000	+606,000	10,606,000
Payments to 1890 colleges and Tuskegee Institute.....	17,785,000	+1,082,000	18,867,000
Special research grants.....	17,698,000	-1,888,000	15,810,000
Competitive research grants...	16,000,000	+9,000,000	25,000,000
Rural development research.....	1,500,000	-1,500,000	--
Animal health and disease research.....	6,000,000	-6,000,000	--
Federal administration (direct appropriation).....	1,496,000	+216,000	1,712,000
 TOTAL AVAILABLE.....	 <u>189,045,000</u>	 <u>+8,728,000</u> a/	 <u>197,773,000</u>

a/ Includes a total increase of \$8,900,000 toward increased operating costs in order to sustain performance levels for continuing programs.
Includes a total increase of \$216,000 for the portion of pay increases effective in FY 1980 which were absorbed in FY 1980 but which are necessary to carry out the programs proposed for FY 1981.

PROJECT STATEMENT

Project	1979	1980 (estimated)	Increase or Decrease	1981 (estimated)
1. Payments under the Hatch Act:				
a. Research program:				
Formula funds.....	\$80,318,206	\$87,918,348	+\$5,192,640	\$93,110,988
Regional Research.....	24,449,834	26,858,563	1,803,000	28,661,563
Subtotal.....	104,768,040	114,776,911	+6,995,640	121,772,551
b. Penalty Mail.....	480,403	476,000	--	476,000
c. Set-aside for Federal administration (3%).....	2,543,862	3,313,089	+216,360	3,529,449
Total, Hatch Act.....	107,792,310	118,566,000	+7,212,000(1)	125,778,000
2. Cooperative forestry research 1/.....	9,500,000	10,000,000	+606,000(2)	10,606,000
3. Payments to 1890 colleges and Tuskegee Institute 1/.....	16,360,000	17,785,000	+1,082,000(3)	18,867,000
4. Special research grants:				
Soil erosion in Pacific Northwest....	450,000	450,000	--	450,000
Dried bean research in North Dakota...	25,000	25,000	-25,000	--
Food and agriculture policies.....	150,000	150,000	--	150,000
Soybean research.....	500,000	500,000	-500,000	--
Pest management research.....	500,000	--	+2,000,000	2,000,000
Pesticide clearance.....	1,000,000	1,000,000	--	1,000,000
Pesticide impact assessment.....	1,745,000	1,810,000	--	1,810,000
Rural development centers.....	300,000	300,000	-300,000	--
Transportation, marketing and storage research.....	500,000	--	--	--
Genetic vulnerability.....	300,000	--	+300,000	300,000
Soybean cyst nematode research in Missouri.....	150,000	250,000	-250,000	--
Bean and beet research in Michigan....	50,000	50,000	-50,000	--
Mushroom byproduct utilization research in Pennsylvania	38,000	38,000	-38,000	--
Animal health research.....	10,000,000	7,000,000	-1,950,000	5,050,000
Energy research.....	--	1,900,000	--	1,900,000
Aquaculture research at Stoneville, Mississippi.....	--	150,000	-150,000	--
Dairy photoperiod research-Michigan...	--	35,000	-35,000	--
Soil and water conservation-Alaska....	--	290,000	-290,000	--
Bean flour research-Texas & Michigan..	--	100,000	-100,000	--
General agricultural research.....	--	2,500,000	-2,500,000	--
Aquaculture research.....	--	--	+500,000	500,000
Antidesertification research.....	--	--	+1,000,000	1,000,000
Germplasm resources.....	--	--	+500,000	500,000
Subtotal, Special research grants	15,708,000	16,548,000	-1,840,000	14,660,000
Alcohol fuels research (Section 1419, P. L. 95-113)	500,000	500,000	--	500,000
Native Latex Act (P. L. 95-592)	--	650,000	--	650,000
Total 1/.....	16,208,000	17,698,000	-1,888,000(4)	15,810,000
5. Competitive research grants:				
Crop production.....	10,000,000	13,000,000	+6,000,000	19,000,000
Human nutrition.....	4,999,976	3,000,000	+3,000,000	6,000,000
Total, Competitive research grants 1/.....	14,999,976	16,000,000	+9,000,000(5)	25,000,000
6. Rural development research 2/.....	1,500,000	1,500,000	-1,500,000(6)	--
7. Animal health and disease research 2/.....	5,000,000	6,000,000	-6,000,000(7)	--
8. Federal administration (direct appropriation).....	1,676,806	1,496,000	+216,000(8)	1,712,000
Unobligated balance.....	1,357,903	--	--	--
Total available or estimate.....	174,325,020	189,045,000	+8,728,000	197,773,000

1/ Includes 3% set-aside for Federal administration.

2/ Includes 4% set-aside for Federal administration.

EXPLANATION OF PROGRAM

The Agriculture, Rural Development, and Related Agencies Appropriations Act of 1980, funds Cooperative Research activities authorized under the following acts:

1. Payments to agricultural experiment stations under the Hatch Act, and for penalty mail - Agricultural Experiment Stations Act of August 11, 1955, Hatch Act of 1887 as amended - 7 U.S.C. 361a-361i; Education Amendments of 1972, Public Law 92-319, June 23, 1972; Public Law 93-471, October 26, 1974; and Public Law 95-113, September 29, 1977, as amended.

The Act of August 11, 1955, as amended, provides that the distribution of Federal payments to States for fiscal year 1955 shall become a fixed base and that any sums appropriated in excess of the 1955 level shall be distributed in the following manner:

- 20% shall be allotted equally to each State.
- not less than 52% shall be allotted to the States as follows:
 - one-half in an amount proportionate to the relative rural population of each State to the total rural population of all States, and
 - one-half in an amount proportionate to the relative farm population of each State to the total farm population of all States.
- not more than 25% shall be allotted to the States for cooperative research in which two or more State agricultural experiment stations are cooperating to solve problems that concern the agriculture of more than one State.
- 3% shall be available to the Secretary of Agriculture for the administration of this Act.

The Act also provides that any amount in excess of \$90,000 available for allotment to any State, exclusive of the regional research fund, shall be matched by the State out of its own funds for research, and for the establishment and maintenance of facilities necessary for the performance of such research.

The Hatch Act provides for the mailing under penalty indicia by agricultural experiment stations of bulletins, reports, periodicals, re-prints of articles, and other publications, including lists of publications necessary for dissemination of results of research. Mailings includes not only those to individual farmers upon request but also to newspapers, libraries, other experiment stations, and organizations interested in results of research and dissemination of such results. Under Title 39 U.S.C. 3206(b) and 3203(a)(4), the Department paid to the U.S. Postal Service \$476,000 to cover postage of mail sent under the penalty privilege by the State agricultural experiment stations during fiscal year 1979. Funds of \$476,000 have been set-aside from the fiscal year 1980 appropriation under the Hatch Act for payments to the U.S. Postal Service.

Three percent of funds appropriated under the Hatch Act is set-aside for Federal administration. Administration includes disbursement of funds and a continuous review and evaluation of the research programs of the State agricultural experiment stations supported wholly or in part from Hatch funds. Cooperative Research encourages and assists in the establishment of cooperation within and between the States, and also actively participates in the planning and coordination of research programs between the States and the Department at the regional and national level.

2. Cooperative Forestry Research - The Cooperative Forestry Research Act of October 10, 1962, 16 U.S.C. 582a-7; Education Amendments of 1972, Public Law 92-318, June 23, 1972.

The Act authorizes funding of research in State institutions certified by a State representative designated by the governor of each State. The Act provides that appropriated funds be apportioned among States as determined by the Secretary after consultation with a national advisory board of not less than seven officials of the forestry schools of the State-certified eligible colleges and universities chosen by a majority of those schools. Determination of apportionments follows consideration of pertinent factors including, but not limited to, areas of non-Federal commercial forest land and volume of timber cut from growing stock. The Act also limits the payments to the amount made available and budgeted from non-Federal sources by the certified institutions for expenditure for forestry research. Three percent of funds appropriated under this Act is set-aside for Federal administration.

3. Payments to 1890 Colleges and Tuskegee Institute - The National Agricultural Research, Extension, and Teaching Policy Act of 1977, Section 1445, Public Law 95-113, September 29, 1977; Public Law 95-547, October 28, 1978.

Public Law 95-113, as amended, provides for support of continuing agricultural research at colleges eligible to receive funds under the Act of August 30, 1890, including Tuskegee Institute. Beginning with fiscal year 1979, there shall be appropriated funds for each fiscal year, an amount not less than 15% of the total for such year under Section 3 of the Act of March 2, 1887. These funds shall be distributed as follows:

-3% shall be available to the Secretary of Agriculture.
-Payments to States in fiscal year 1978 is a fixed base. Of funds in excess of this amount:

20% shall be allotted equally to each State.

40% shall be allotted in an amount proportionate to the rural population of the State in which the eligible institution is located to the total rural population of all the States in which eligible institutions are located, and

40% shall be allotted in an amount proportionate to the farm population of the State in which the eligible institution is located to the total farm population of all the States in which eligible institutions are located.

Allotments to Tuskegee Institute and Alabama A&M University shall be determined as if each institution were in a separate State. Three percent of the funds appropriated under this Act is set aside for Federal administration. This includes disbursements of funds and review and evaluation of proposals.

4. Special Research Grants - Section 2(c), Act of August 4, 1965, 7 U.S.C. 450i as amended by Public Law 95-113, September 29, 1977.

Section 2 of the Act of August 4, 1965 as amended, authorizes Special Research Grants for periods not to exceed five years to land grant colleges and universities, state agricultural experiment stations, and to all colleges and universities having a demonstrable capacity in food and agricultural research to further the programs of the Department of Agriculture. Special Research Grants are awarded on the discretionary basis as well as using a competitive peer panel process in the selection of proposals to be funded. In fiscal year 1980, \$16,548,000 is appropriated for this program. In addition, \$500,000 is for Alcohol Fuel Research Grants in accordance with Section 1419 of Public Law 95-113, and \$650,000 is for research under the Native Latex Commercialization and Economic Development Act of 1978.

Research on food and agriculture policies, soybeans, pesticide clearance, soil erosion in the Pacific Northwest, pesticide impact assessment, energy, animal health, rural development centers and other high priority research will receive emphasis in FY 1980. Research on alcohol fuels is also carried out in accordance with Section 1419 of Public Law 95-113. Research will also be carried out under the Native Latex Commercialization and Economic Development Act of 1978.

5. Competitive Research Grants - Section 2(b), Act of August 4, 1965, 7 U.S.C. 450i as amended by Public Law 95-113, September 29, 1977.

Section 2 of the Act of August 4, 1965 as amended, authorizes Competitive Grants for periods not to exceed five years to State Agricultural Experiment Stations, all Colleges and Universities, other research institutions and organizations, Federal agencies, private organizations or corporations and individuals to further the programs of the Department of Agriculture. By obtaining the participation of outstanding researchers in the entire U.S. scientific community, emphasis will be placed on basic research critical to food production and human nutrition including biological stress of plants, genetic mechanisms of plants, plant nitrogen fixation, plant photosynthesis and human nutrient requirements.

6. Rural Development Research - Title V, Rural Development Act of 1972, 7 U.S.C. 2661-2668; Public Law 94-259, April 5, 1976, Public Law 95-113, September 29, 1977.

The Rural Development Act of 1972, as amended, provides that funds are allocated as follows:

- 20% shall be allocated equally to each State.
- 66% shall be allocated to each State as follows:
 - one-half in an amount proportionate to the relative rural population of each State to the total rural population of all States, and
 - one-half in an amount proportionate to the relative farm population of each State to the total farm population of all States.
- 10% shall be allocated to the States for research serving two or States in which universities in two or more States cooperate or which is conducted by one university to serve two or more States.
- 4% shall be available to the Secretary of Agriculture for Federal administration, national coordination, and program assistance to the States.

Four percent of the funds appropriated under the Rural Development Act is set aside for Federal Administration. This includes disbursement of funds and review and evaluation of proposals. The review and evaluation includes consideration of the legislative requirements, of the quality of the proposal, and of potential impact of the research proposed on rural communities.

7. Animal Health and Disease Research - The National Agricultural Research, Extension, and Teaching Policy Act of 1977, Section 1433, Public Law 95-113, September 29, 1977.

Section 1433 provides for support of livestock and poultry disease research in colleges of veterinary medicine and in eligible State agricultural experiment stations. This funds shall be distributed as follows:

- 4% shall be retained by the Department of Agriculture for administration, program assistance to the eligible institutions, and program coordination.
- 48% shall be distributed in an amount proportionate to the value of an income to producers from domestic livestock and poultry in each State to the total value of and income to producers from domestic livestock and poultry in all the States.
- 48% shall be distributed in an amount proportionate to the animal health research capacity of the eligible institutions in each State to the total animal health research capacity in all the States.

8. Federal Administration (direct appropriation) - Authority for direct appropriations is provided in the annual Agriculture, Rural Development, and Related Agencies Appropriations Act. These funds are used to provide support services in connection with research planning and coordination of all programs administered by Cooperative Research.

JUSTIFICATION OF INCREASES AND DECREASES

(1) An increase of \$7,212,000 under the formula provisions of the Hatch Act for increased operating costs (\$118,566,000 available in 1980).

Need for Change. Research conducted by State scientists has been equivalent to and cooperative with that performed by Federal researchers in contributing to the high level and efficiency of food and fiber production, while reducing environmental and food safety dangers. The cost per unit of research conducted by State Agricultural Experiment Stations, Forestry Schools, and the Colleges of 1890 and Tuskegee Institute continues to increase just as is the case with the inhouse USDA program. The increase results from rising salaries and wages, increased cost of services, supplies, materials and equipment. State experiment stations receive about 18 percent of their support from the USDA. This proposal compensates for the Federal share of the increased portion of the salaries and wages paid to the State employees, as well as other increased operating costs, and supports the Federal role in the cooperative research partnership between the Federal government and the States.

It is also recommended that the States strengthen programs in high priority basic research. There is general agreement that the United States is lagging seriously in its store of basic information in the agricultural and food sciences, both in effort expended and in the interpretation and technology transfer to the developmental/applied stage. Basic research for the most part is long range and is the leading edge of knowledge, and thus, must be a continuing component of Federal and State laboratories. Since basic information is being used up rapidly, the United States must replenish this information continuously if we are to remain the leader in agricultural production and in the scientific communities of the world. Clearly, innovation is needed if agriculture is expected to feed more people, generate jobs, enhance the quality of the environment, and otherwise contribute more to National welfare. A pool of basic knowledge sets the base and limits of applied and developmental research which in turn become translated into technologies for application and use.

Nature of Change. The State Agricultural Experiment Stations have a long history of research accomplishments. Formula funds undergird the whole research and training system for agriculture, as well as supporting a variety of basic and applied research. States themselves put-up four to five times as much money on the average as the Federal government for research on a vast array of agricultural subjects. This network of experiment stations contains a full spectrum of expertise and the equipment and facilities to continue producing significant and original research. This increase in formula funding for the State agricultural experiment stations will provide for increased operating costs or augmentation of high-priority programs including the areas mentioned above.

(2) An increase of \$606,000 for Cooperative Forestry Research for increased operating costs (\$10,000,000 available in 1980).

Need for Change. The same factors described under the Hatch Act payments have increased the cost of maintaining the current ongoing level of activity of the base program of cooperative forestry research at the State agricultural experiment stations and schools of forestry. This provision for the Federal share of the increased portion of the salaries and wages paid to the State employees, as well as other increased operating costs, supports the Federal role in the cooperative research partnership between the Federal government and the States.

It is also recommended that the States strengthen programs on high priority basic research. The 1980 draft assessment of the Resources Planning Act predicts that by the year 2030 the demand for timber will be twice the 1976 level. One of the most cost effective ways to attain that level of output is with higher quality and faster growing trees on each acre of commercial forest land. A better, in depth understanding of the fundamental processes that control growth will permit the selection of resistant species and development of improved practices to produce them. The specific basic research problem areas have been identified by the States in their Regional-National planning efforts.

Nature of Change. The Cooperative Forestry Research program is planned and directed to provide answers to the complex questions that face forest land managers who are seeking to produce an adequate timber supply for home and other construction. It encourages and assists the States in carrying on a program of forestry research and develops a trained pool of forest scientists capable of conducting needed forestry research. This increase in formula funding for the State agricultural experiment stations and schools of forestry will provide for increased operating costs or augmentation of high priority programs including the areas mentioned above.

(3) An increase of \$1,082,000 for increased operating costs at the Colleges of 1890 and Tuskegee Institute (\$17,785,000 available in 1980).

Need for Change. The same factors described under the Hatch Act payments have increased the cost of maintaining the current ongoing level of activity of the base programs of the Colleges of 1890 and Tuskegee. This increase in funding will provide for rising salaries and wages and for increased cost of supplies, materials and equipment. It is also recommended that these institutions strengthen high priority basic research programs in crop and animal production and add additional substance to programs directed toward small farm research.

Nature of Change. This program provides support for continuing agricultural research at colleges eligible to receive funds under the Act of August 30, 1890. Research at these institutions places emphasis in the areas of rural development and quality of living, limited resource farmers and human nutrition. This increase in formula funding will provide for increased operating costs for the Colleges of 1890 and Tuskegee Institute or to augment high priority programs.

(4) A net decrease of \$1,888,000 for Special Research Grants as follows:

(a) A decrease of \$3,688,000 for selected Special Research Grants (\$8,738,000 available in 1980) consisting of:

Dried bean research in North Dakota.....	-\$25,000
Soybean cyst nematode research in Missouri.....	-250,000
Bean and beet research in Michigan.....	-50,000
Mushroom byproduct utilization research in Pennsylvania.....	-38,000
Aquaculture research at Stoneville, Mississippi....	-150,000
Dairy photoperiod research in Michigan.....	-35,000
Bean flour research in Michigan, Texas.....	-100,000
Soil and water conservation in Alaska.....	-290,000
Soybean research.....	-500,000
Rural development centers.....	-300,000
Animal health research.....	<u>-1,950,000</u>
	3,688,000

Need for Change. This decrease realigns research effort at this time since prior funding has already directed considerable attention to these areas. The research grants funded in fiscal year 1980 and prior years will be used over a period of up to 5 years for completion of studies. The level of funding and the time period of support provided by these grants will yield important information. As results of this research become known, an assessment can be made of the need for augmenting this base of scientific knowledge developed by these programs.

Nature of Change. This change will eliminate the specific areas of research identified above except for animal health. The most critical problems affecting the livestock and poultry industry will continue to receive emphasis with the remaining \$5,050,000 proposed for continuation in fiscal year 1981. Amounts allotted to the States on a formula basis permit State institutions to fund research in those areas that they identify as high priority and could be a possible source of funding for these programs if the States wish to continue the research.

(b) A decrease of \$2,500,000 for general agricultural research grants (\$2,500,000 available in 1980).

Need for Change. In fiscal year 1980, Congress provided \$2,500,000 to fund high priority, but unspecified, agricultural research projects. Specific identification of projects to be financed with these funds is currently being developed. Examples of lines of work under consideration for funding include integrated pest management systems, germplasm, range land improvement, resource conservation, aquaculture, genetic vulnerability, animal health, and forage production systems. It is probable that some research grants to be awarded in 1980 will be in the same high priority lines of work identified for increased support in 1981. This will provide an opportunity to implement some of these proposed 1981 increases during FY 1980.

Nature of Change. The general agricultural research grants item will be eliminated in FY 1981. The Special Research Grants normally provide an initial thrust to a specific problem area requiring additional research effort. The \$2,500,000 general increase in FY 1980 will be used for this purpose. For FY 1981 it is proposed that the general agricultural research grant item be deleted and replaced with more specific increases for Special Research Grants noted elsewhere.

(c) An increase of \$500,000 for Special Research Grants (none available in 1980) for research on pest management systems.

Need for Change. Integrated Pest Management is an interdisciplinary effort to develop crop protection systems that optimize naturally-occurring pest control factors and utilize man-initiated actions to suppress pests only when it is apparent that crop damage thresholds will be exceeded and then in a manner fully compatible with environmental, economical, and sociological concerns. This amount of grant funds will serve to stimulate formation of 5 to 6 new interdisciplinary teams and to fund their efforts to conceptualize the system to be researched and the initial experimentation to develop integrated systems for crop protection. Previous experience (1973-79) with this grant program has clearly demonstrated that such "seed money" has had a large magnifier effect and has greatly focused peripheral research (and extension) efforts at funded institutions. The "seeded" teams have readily harnessed funds from other Federal departments and agencies, private foundations, and grower groups.

This special grant effort has been one of USDA-State partnerships most successful programs. Without such an effort, newly emerging interdisciplinary teams, which all sectors agree are key to future agricultural design and management, have almost no place to turn for funding. There are too many institutional barriers to enable most interdisciplinary teams to get started. Special research grant funds play an important role in bringing forces together and providing "glue" to their efforts.

Nature of Change. Grants will be awarded, on a competitive basis, to State institutions to develop 5 to 6 interdisciplinary research teams aiming at development of integrated systems for management of pest populations. This program contrasts with the competitive grant approach in that it is systems oriented. That is, all funds are utilized to conceptualize a system and its object of control (what needs to result) and to initiate research in areas devoid of knowledge that is essential to understanding of the entire system. It is a scientific approach to developing new crop protection methods that take into consideration complex biological and socio-economical systems.

(d) An increase of \$1,500,000 for Special Research Grants for development of integrated pest management systems by a consortium of 15 State Agricultural Experiment Stations (no funds available in 1980).

Need for Change. Modern U.S. agriculture has benefitted from practices for controlling pests to assure high quantity and quality farm produce. However, continual reliance on a single tactic for pest control, pesticides, for example, has been counter-productive in some cases, such as development of pest resistance and adverse environmental impacts. Development and use of environmentally sound, economically feasible, IPM systems would result in reduction of pesticide usage and thus a reduction of possible adverse affects. The objectives and thrusts of IPM are compatible with the concepts of pest management advanced by the USDA. The research needs to be addressed by the consortium of scientists to develop pest management systems useful for important crop grouping on a national basis.

Nature of Change. The State agricultural experiment stations, schools of forestry, and the colleges of 1890 and Tuskegee Institute, are involved in research on methods for pest management. However, there has been only minimum research activities on development of systems into which various methods have been integrated; so as to take advantage of the strengths of each pest control tactic. Scientists, economists and engineers are available at the consortium of 15 land-grant institutions to successfully improve predictive models and develop integrated systems for control of single or multiple pest complexes in cotton, alfalfa, soybeans, and apples.

Responsibility for funding this program in FY 1981 will be jointly shared with the Environmental Protection Agency. A set of procedures for interagency coordination and management of the program has been developed.

(e) An increase of \$500,000 for Special Research Grants for research related to germplasm resources (no funds available in 1980).

Need for Change. Genetic materials are a valuable national resource. More effort is needed in identifying, cataloguing, preserving, and developing plant germplasm resources. One of the immediate needs is for support to continue and improve living plant-germplasm repositories, such as those for fruit and nuts when the germplasm cannot be stored as seed.

Nature of Change. State agricultural experiment station scientists will search for and identify genetic variability such as resistance to specific diseases, insects, and environmental extremes and yield. The nature of the heritability of the resistance will be studied, the material will be catalogued, stored in a national germplasm information network, and preserved for future use. Scientists will incorporate desired germplasm into new cultivars and constantly seek to broaden the germplasm base through intra- and interspecific crosses.

(f) An increase of \$300,000 for Special Research Grants (none available in 1980) for genetic vulnerability studies.

Need for Change. Genetic variation, the basis for inherited improvement, is used by breeders to produce more desirable crop varieties and hybrids. Pests such as diseases and insects have the ability to change genetically so they can attack previously resistant host plants. Modern cropping techniques require highly uniform fields for a number of plant characteristics. Experiences with diseases such as wheat stem rust and southern corn leaf blight have shown that large acreages of one or a few genetically uniform varieties or hybrids are extremely vulnerable to loss by pests, abnormal weather patterns or other crop production difficulties. Genetic variability is represented in wild and unimproved populations and can be generated with mutation causing agents. Currently much natural variation is being lost prior to collection because of urbanization, modernization of cropping practices, and other causes. With reduced variation available potential genetic vulnerability increases and future production of all major crops are threatened.

Nature of Change. Additional funds through Special Research Grants would be awarded to help understand the probability of losses from genetic vulnerability and the means of counteracting these losses. Included in these studies would be information systems to identify the germplasm, evaluation of genetic variability available, investigation of crop variety and hybrid ecology leading to reduced vulnerability, and evaluation of potential hazards from new production technology currently being implemented.

(g) An increase of \$500,000 Special Research Grants for research on aquaculture (no funds available in 1980).

Need for Change. The commercial aquaculture industry has grown from less than 2 million pounds of production in 1964 to 100 million pounds at the present. Projections are that the U.S. production will be over 250 thousand metric tons by 1985.

Aquaculture is capable of making a significant contribution to the protein needs of the U.S. and the World if problems related to intensified pollution can be solved. Research is needed to enhance the stability and diversity of aquatic production. Increased domestic production of aquatic foods will benefit the economy and the entire population by helping reduce the trade deficit which now includes the importation of over 2 billion pounds of edible seafood products annually. Seafood landings are not likely to increase, therefore, the increased demand for fish must be met by imports or through aquaculture.

Nature of Change. Research funds would be provided through a special grants program to eligible state institutions in which focus would be on local and regional programs which contribute to national objectives related to aquaculture production. Specific objectives of the program include: improved production efficiency in diet formulation, reproduction and breeding, disease and parasite control; improved water quality requirements for production and factors affecting the quality of water discharge; and increased production of catfish, trout, bait minnows, crawfish and other selected fresh water species currently in production or with high potential.

(h) An increase of \$1,000,000 Special Research Grants for research to combat desertification (no funds available in 1980).

Need for Change. Deterioration of range condition has led to semi-arid ranges in risk of becoming deserts (desertification). These range ecosystems need to be stabilized and many need improvement in order to restore to potential levels of productivity. Research is needed for better and more economical techniques of range improvement, management, and conservation. Research is required to develop long term management practices leading to recreation, wildlife, and livestock productivity consistent with range potential and social goals, and for improved resource assessment and monitoring techniques.

Nature of Change. State agricultural experiment stations and other eligible institutions will increase their effort to gain knowledge for measuring ecological and socio-economic impacts of resource use including range uses such as grazing and recreation. New and improved techniques for allocation of resources including development of improved practices for grazing, recreation, and wildlife management will be studied. More economical and environmentally acceptable methods of range improvement will be sought to restore ranges to their ecological site potential in order to achieve both high biological productivity and conserve the ranges. Scientists at State agricultural experiment stations and other eligible institutions will also work with scientists and range managers in other agencies and Mexico to develop a common information base for resource assessment, storage and retrieval methods and improved techniques for assessment and monitoring range condition.

(5) An increase of \$9,000,000 for Competitive Research Grants (\$16,000,000 available in 1980).

The Competitive Research Grants program was initiated in order to provide special emphasis on basic research critical to enhancing production of food, fuel and fiber, and to improving human nutrition. The competitive grants are meant to complement the ongoing research efforts of the USDA and the State agricultural research community by obtaining the participation of research scientists throughout the entire U.S. scientific community who have outstanding expertise in these related areas, and to focus additional effort on programs judged to be of highest priority.

(a) An increase of \$6,000,000 for Competitive Research Grants for plant science research targeted to crop production (\$13,000,000 available in 1980).

Need for Change. The four areas of plant science research selected for increased support provide great opportunities to develop fundamental knowledge necessary to increase crop productivity and the dependability of the food supply. These target areas are photosynthesis, biological nitrogen fixation, genetic mechanisms for crop improvement, and plant protection from biological stresses (e.g. --insect, pathogens, viruses, and nematodes). The number and quality of the research proposals received in fiscal years 1978 and 1979 demonstrated extensive availability of high quality research capability for additional research in this program. The mission-oriented basic research needs are:

Biological Nitrogen Fixation - Adequate supplies of nitrogen are essential to crop productivity. Increased crop yields during the past 25 years have paralleled increased use of nitrogen fertilizer. For several reasons, including energy costs, existing biological technologies for providing nitrogen to crops need to be improved and new technologies developed. This area of research includes the nitrogen-fixing mechanisms inside plant, the mechanism of nodulation and the assimilation of the fixed nitrogen into the plant.

Genetic Mechanisms for Crop Improvement - The initial objective is to determine those plant processes and characteristics which can be used by plant breeders in manipulating plant varieties to increase crop productivity. The research is also intended to identify new ways of transferring desirable genes to plant species used by man. Conventional plant breeding methods can be used to transfer germplasm only among close relatives in the plant kingdom. Biochemists and plant physiologists must be brought into an active team participation with plant breeders and other scientists working with genetic and cultural improvement of crops. Studies are needed to use tissue culture techniques and other novel approaches to accelerate genetic improvement of crop plants. An understanding of the genetic systems of crop plants and their regulation is an essential requirement. The development of cellular and molecular methods would permit identification of desirable plant characteristics (or genes) and facilitating their transfer among plants.

Photosynthesis - Since 95 percent of the dry weight of plants is a result of photosynthesis, studies on this process have high priority in efforts to improve crop productivity. Studies are needed to determine the fundamental biology involved in more efficient subdividing of the products of photosynthesis into food products of high nutritional value. Expansion of research to develop new methodology for plant breeders would help in identifying and incorporating improved photosynthetic efficiency into crops. Identification of aspects of photosynthesis which limit the conversion of solar energy into stable chemical products (sugars, starch, etc.) is highly important if attempts at enhancing photosynthetic efficiency are to be successful.

Biological Stresses on Plants - Plant pests are a major limitation to high crop productivity. Progress in reducing pest losses has been impeded by the rapid obsolescence of available technology, by various changes in production practices, and by the genetic changes in the pests affecting crop productivity. Studies are needed on the effects of pests and adverse environmental stress effects that result from pests and methods of combating them. Emphasis will be on stresses caused by weeds, nematodes, pest insects, and pathological micro-organisms. Attempts will be made to identify how plants react to stressful interactions and how damage from such interactions may be reduced or eliminated.

Nature of Change. Enhanced funding will permit funding of a greater number of the highly meritorious and relevant research projects which have been proposed for the program to date. Research will be conducted on the four crop productivity areas of photosynthesis, nitrogen fixation, genetic engineering for plants, and biological stress on plants. Distribution of funds among the four areas will be based on the selection of projects from all areas on the basis of their scientific merits and relevance. Capable scientists from universities, private sector research, and government agencies will be encouraged to apply for the grants.

(b) An increase of \$3,000,000 for Competitive Research Grants for human nutrition research (\$3,000,000 available in 1980).

Need for Change. Although much is known about human nutrition, the base of research knowledge needs to be expanded if we are to make sound recommendations to improve dietary practices for humans. Research at the cellular level, for example, has established many of the metabolic pathways which function in humans. Such knowledge must be expanded above the cellular level so we can understand what happens nutritionally within the total organism. There could be immense benefits from this research. Planning food production on the basis of nutritional needs for people, for example, could bring about the best uses of agricultural resources. Better knowledge of the nutritional requirements at each stage of the life cycle would make it possible to design food programs to maintain longer, more productive, and satisfying lives. This research would move a step closer in meeting the national goal of USDA to provide foods to assure adequate diets to all.

Nature of Change. Research will focus on the areas of human requirements necessary for optimum growth and well-being. Emphasis will be placed on the biochemical and metabolic relationships of the nutrients consumed by the United States populations. Research will also focus on the determinants and interactions of food availability, acceptability, and nutritive value. Capable scientists, regardless of organizational affiliation, will be encouraged to apply for grants.

(6) A decrease of \$1,500,000 for rural development research (\$1,500,000 available in 1980).

Need for Change. This proposal eliminates this program of research which has been funded on a pilot basis since fiscal year 1974 under Title V of the Rural Development Act. Where the pilot programs have been successful, the States may continue rural development research efforts as a part of their ongoing programs.

Nature of Change. This program will be terminated. States could continue research in this area within available resources if they so desire.

(7) A decrease of \$6,000,000 for Animal Health and Disease Research, Sec. 1433, P.L. 95-113 (\$6,000,000 available in 1980).

Need for Change. Seventy-eight institutions are currently eligible to receive payments under formula provisions of this program first funded in FY 1979. Funds have not been adequate to support a viable program with so many eligible institutions. Animal health and disease research will continue to be conducted by Federal and State research institutions under other authorizations which provide opportunity for more concentrated efforts in solving high priority problems of national significance.

Nature of Change. This portion of the animal health and disease research program is proposed for elimination. Ongoing Federal and State research programs will sustain the overall animal health and disease research efforts. Research initiated under this program can be continued by the States as part of their ongoing programs if they so desire.

(8) An increase of \$216,000 for Federal Administration (direct appropriation) for fiscal year 1980 pay increases (\$1,496,000 available in 1980).

Proposed Legislation, Proposed for Later Transmittal

An increase of \$5,000,000 for a facilities construction program at the 1890 Colleges and Tuskegee Institute (No funds available in 1980).

Need for Change. Section 1445 of P.L. 95-113 authorized continued Federal funding of the agricultural research programs carried out by the 16 land-grant colleges of 1890 and Tuskegee Institute. Existing facilities utilized for research at these institutions need to be renovated and improved to provide the conditions necessary to conduct top quality research. In addition, new facilities need to be constructed since either the existing ones are not adequate for the conduct of highly complex research, or the existing facilities do not contain adequate space for the current staff and space needs for their projected research programs. The deficiencies in present facilities have been due to inadequate State funding and little or no Federal funding in the past. As a result, the institutions have had to encroach on the space of resident instruction and other campus programs in order to have the staff and programs authorized under current funding levels.

Nature of Change. The proposed funds would permit the initiation of a five year grant program at \$5.0 million per year requiring 100 percent State matching for facility construction at the 17 campuses of the 1890 colleges and Tuskegee Institute. Authorizing legislation is required. This program would provide "catch-up" funding for capital improvements including the major upgrading of existing facilities to meet adequate working conditions, to improve operating efficiency, and to meet new program requirements for food and agricultural research. This program would provide a research program commensurate with the role of these institutions in participating with 1862 institutions as partners to meet the needs of their States. One of the grant selection criteria would be the completeness of the schools' plans to integrate the new facilities into their overall, long-range education plans (e.g., plans for increasing faculty, housing new students, etc.). SEA-CR would monitor the schools' comprehensive plans to assure that the schools can fully utilize their new research capacity.

SCIENCE AND EDUCATION ADMINISTRATION - COOPERATIVE RESEARCH

STATUS OF PROGRAM

The funds appropriated for Cooperative Research provide the Federal Government's support for land-grant agricultural experiment stations, approved schools of forestry, the 1890 land-grant institutions and Tuskegee Institute, Colleges of Veterinary Medicine and other eligible institutions in the various States and in Puerto Rico, Guam, the Virgin Islands, and the District of Columbia.

The State institutions conduct research and experiments on the problems continuously encountered in the development of a permanent and sustaining agriculture and forestry, and in the improvement of the economic and social welfare of rural and urban families. Because of differences in climate, soil, market outlets, and other local conditions, each State has distinct problems in the production and marketing of crops and livestock. Farmers, foresters, and rural people in the individual States naturally look to their State agricultural experiment stations, universities and colleges for solution of the State and local problems and request services to help meet changing conditions.

Research programs at State institutions, to be most effective, include participation in regional and national programs. Joint effort by a group of State institutions is the most effective and often the only practical approach to problems of common interest. The stations are acting together as regional groups to provide cooperative coordinated attacks on problems of regional and national interest. In a similar manner, the research programs of the State institutions and the Department of Agriculture are supplementary and interdependent.

The Federal formula funds constitute a powerful force in bringing about inter-State cooperation and Federal-State collaboration in the planning and conduct of this overall program of agricultural research. Therefore, the impact of the Federal formula funds cannot be fully evaluated solely on the basis of the amount of funds provided.

Research at the State institutions is organized into a program of projects that is submitted for approval by Cooperative Research. The program of projects is financed wholly or in part from Federal formula and grant funds. Programs and projects are evaluated periodically with station scientists by administrators and technical staff of Cooperative Research. The evaluation includes consideration of quality and productivity of the program and projects. The continuing process of research evaluation by station scientists and the staff of Cooperative Research results in a dynamic program with approximately 15 to 20 percent of the projects being replaced by new and/or revised projects each year.

Table 1
Distribution of Federal Payments to States for Research at State Agricultural Experiment Stations and Other State Institutions - Fiscal Year 1979

State	Hatch Act, as amended	Coop.	1890	Special : Colleges & Research : Tuskegee : Institute :	Rural : Competitive : Research : Develop- : Grants :ment Act : Research :	Animal : Health & Disease : Direct : Appro.) :	Federal : Admin. : (Direct : Appro.) :	Total : Federal Funds
	Regular : Regional : Research : Total : (N-S)	Forestry : Research : Tuskegee : Institute :	Colleges & Research : Tuskegee : Institute :	Competitive : Research : Grants :ment Act : Research :	Health & Disease : Direct : Appro.) :	Admin. : (Direct : Appro.) :	Federal Funds	
Alabama	2,002,579:	503,843:	2,506,422:	317,675: 1,960,398:	363,502: ...	27,948: 130,284:	... : ...	5,306,229
Alaska	543,016:	81,013:	624,029:	130,833: ...	46,062: ...	7,340: 8,016:	... : ...	816,280
Arizona	734,336:	453,430:	1,187,766:	124,605: ...	7,168: 184,500:	10,478: 54,156:	... : ...	1,568,673
Arkansas	1,692,765:	441,483:	2,134,248:	292,763: 845,049:	335,546: 94,000:	24,529: 68,868:	... : ...	3,795,003
California	2,127,981:	999,396:	3,127,377:	323,904: ...	963,325: 1,700,000:	32,862: 272,136:	... : ...	6,419,604
Colorado	966,572:	555,188:	1,521,760:	149,518: ...	324,375: 305,400:	15,092: 124,800:	... : ...	2,440,945
Connecticut	828,012:	297,815:	1,125,827:	99,693: ...	43,791: ...	12,920: 11,928:	... : ...	1,294,159
Delaware	582,079:	222,779:	804,858:	56,096: 355,956:	91,316: ...	7,908: 11,148:	... : ...	1,327,282
District of Columbia	95,346:	32,159:	127,505:	... : 66: 66:	487,900: ...	... : ...	... : ...	615,405
Florida	1,328,610:	400,683:	1,729,293:	255,395: 641,880:	160,250: 316,000:	21,925: 88,284:	... : ...	3,213,027
Georgia	2,177,903:	637,954:	2,815,857:	330,132: 1,045,260:	720,766: 69,100:	32,135: 154,632:	... : ...	5,167,882
Guam	237,855:	52,392:	290,247:	... : 47,974: 47,974:	4,036: ...	... : ...	... : ...	294,283
Hawaii	594,840:	227,991:	822,831:	74,781: ...	... : 47,974:	... : 7,392:	... : ...	960,730
Idaho	895,200:	369,972:	1,265,172:	211,798: ...	306,406: ...	14,215: 82,020:	... : ...	1,879,611
Illinois	2,588,116:	570,611:	3,158,727:	180,658: ...	389,812: 1,040,000:	47,489: 180,696:	... : ...	4,997,382
Indiana	2,345,703:	521,199:	2,866,902:	161,974: ...	649,366: 355,000:	43,813: 113,076:	... : ...	4,190,131
Iowa	2,431,906:	1,097,430:	3,529,336:	112,149: ...	1,242,532: 328,076:	83,716: 280,956:	... : ...	5,576,765
Kansas	1,541,601:	480,495:	2,022,096:	81,009: ...	108,436: 205,000:	26,419: 157,716:	... : ...	2,600,676
Kentucky	2,453,457:	503,327:	2,956,784:	205,570: 1,102,248:	156,232: 133,000:	41,640: 91,668:	... : ...	4,687,142
Louisiana	1,562,474:	423,782:	1,986,256:	298,991: 771,624:	215,697: 350,000:	23,537: 92,100:	... : ...	3,738,205
Maine	814,565:	310,399:	1,124,964:	274,079: ...	38,552: ...	11,585: 17,316:	... : ...	1,466,496
Maryland	1,112,486:	390,562:	1,503,048:	143,289: 560,494:	54,936: 249,000:	17,723: 70,968:	... : ...	2,599,458
Massachusetts	977,861:	381,241:	1,359,102:	137,061: ...	115,367: 681,000:	14,871: 19,440:	... : ...	2,326,841
Michigan	2,408,627:	506,622:	2,915,249:	286,535: ...	657,422: 971,000:	42,727: 138,120:	... : ...	5,011,053
Minnesota	2,308,001:	541,861:	2,849,862:	230,482: ...	788,217: 317,500:	43,516: 167,832:	... : ...	4,397,409
Mississippi	2,101,432:	556,007:	2,657,439:	305,219: 1,028,148:	85,508: 35,000:	66,546: 56,712:	... : ...	4,234,572
Missouri	2,270,844:	450,853:	2,721,697:	224,254: 1,014,068:	574,609: 394,000:	39,131: 130,920:	... : ...	5,098,679
Montana	853,559:	400,178:	1,253,737:	193,114: ...	204,304: 110,000:	13,518: 91,956:	... : ...	1,866,629
Nebraska	1,412,582:	511,906:	1,924,488:	68,553: ...	309,435: 360,000:	24,703: 147,648:	... : ...	2,834,827
Nevada	534,298:	219,334:	753,632:	49,868: ...	25,853: ...	7,166: 28,620:	... : ...	865,139
New Hampshire	652,901:	223,245:	876,146:	174,430: ...	... : 37,900:	16,512: 9,298:	... : ...	1,114,286
New Jersey	958,856:	616,969:	1,575,825:	105,921: ...	521,878: 130,000:	14,898: 26,004:	... : ...	2,374,526
New Mexico	761,928:	240,951:	1,002,879:	118,377: ...	16,133: ...	10,802: 39,264:	... : ...	1,187,455
New York	2,363,326:	888,857:	3,252,183:	261,623: ...	892,909: 1,388,000:	78,037: 206,256:	... : ...	6,079,008
North Carolina	3,279,037:	695,508:	3,974,545:	311,447: 1,454,348:	98,142: 580,500:	52,593: 117,576:	... : ...	6,589,151
North Dakota	1,073,834:	339,901:	1,413,735:	37,412: ...	32,136: 55,000:	17,737: 58,764:	... : ...	1,614,784
Ohio	2,845,507:	547,129:	3,392,636:	186,886: ...	811,136: 358,000:	143,016: 50,843:	... : ...	4,942,517

State	Hatch Act, as amended			Coop.			1890			Competitive:			Rural			Animal		
	Regular	Regional	Research	Total	(M-S)	Institute	Forestry	Colleges &	Special	Research	Develop-	Health &	Disease	Admin.	(Direct	Federal	Funds	
Oklahoma	1,503,116:	362,817:	1,865,933:	155,746:	744,029:	300,737:	85,000:	23,336:	134,160:	..	..	..	..	..	3,308,941	..	..
Oregon	1,113,871:	567,588:	1,681,459:	342,588:	753,383:	80,000:	55,455:	91,332:	..	..	..	..	..	..	3,004,217	..	..
Pennsylvania	2,890,166:	732,188:	3,622,354:	242,939:	..	576,391:	390,000:	49,096:	125,376:	..	..	..	..	..	5,006,156	..	..
Puerto Rico	2,293,891:	449,270:	2,743,161:	..	..	48,233:	..	..	34,225:	7,164:	..	..	..	..	2,832,783	..	..
Rhode Island	543,363:	232,261:	775,624:	43,640:	..	217,529:	125,000:	..	..	7,119:	12,684:	..	..	..	1,181,596	..	..
South Carolina	1,743,324:	415,973:	2,159,297:	249,167:	859,378:	32,908:	60,000:	..	..	24,517:	25,704:	..	..	..	3,410,971	..	..
South Dakota	1,091,714:	342,836:	1,434,550:	62,325:	..	7,307:	..	..	..	18,560:	101,676:	..	..	..	1,624,418	..	..
Tennessee	2,420,840:	515,889:	2,936,729:	218,026:	1,108,354:	415,649:	100,000:	..	..	38,662:	64,812:	..	..	..	4,882,232	..	..
Texas	3,076,026:	734,546:	3,810,572:	267,851:	1,400,656:	494,289:	613,000:	..	..	48,565:	362,604:	..	..	..	6,997,537	..	..
Utah	673,632:	412,832:	1,086,514:	93,465:	..	20,627:	250,000:	..	..	9,264:	34,476:	..	..	..	1,494,346	..	..
Vermont	697,925:	195,115:	893,040:	168,202:	..	37,637:	200,000:	..	..	10,114:	16,752:	..	..	..	1,325,745	..	..
Virginia	2,083,891:	499,254:	2,583,145:	280,307:	977,310:	183,641:	268,000:	..	..	32,386:	70,956:	..	..	..	4,395,745	..	..
Virgin Islands	158,220:	72,280:	230,500:	4,071:	234,571
Washington	1,271,940:	784,167:	2,056,107:	336,360:	..	425,682:	452,000:	..	..	20,705:	107,532:	..	..	..	3,398,386	..	..
West Virginia	1,350,691:	325,313:	1,676,004:	199,342:	..	36,698:	..	..	..	18,765:	17,652:	..	..	..	1,948,461	..	..
Wisconsin	2,319,330:	618,442:	2,937,772:	236,711:	..	622,247:	655,000:	..	..	43,317:	176,148:	..	..	..	4,671,195	..	..
Wyoming	626,221:	319,510:	945,731:	87,237:	..	101,752:	75,000:	..	..	8,862:	43,812:	..	..	..	1,262,394	..	..
Other	168,225:	168,225:	168,225:	..	..	..	..	..	..	..	..	..	..	..	1,68,225	..	..
Subtotal	318,206:	24,442,971:	104,761,177:	9,500,000:	15,869,200:	15,719,810:	14,549,976:	1,440,000:	4,800,000:	..	..	..	..	..	166,640,163	..	..
Committee of Nine (Travel)	760,142:	33,729:	793,871:	..	..	65,000:	..	..	24:	..	..	..	..	..	6,863	..	..
Unobligated balance .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	858,895	..	..
Subtotal	81,078,348:	24,483,563:	105,561,911:	9,500,000:	15,869,200:	15,784,810:	14,550,000:	1,440,000:	4,800,000:	..	..	..	..	..	167,505,921	..	..
Federal administration .....	..	..	2,543,862:	..	..	490,800:	488,190:	450,000:	60,000:	..	..	..	..	..	5,909,658	..	..
Unobligated balance .....	..	..	484,227:	..	..	490,800:	488,190:	450,000:	60,000:	..	..	..	..	..	503,421	..	..
Subtotal .....	..	..	3,028,089:	..	..	..	..	..	..	..	..	..	..	..	6,413,079	..	..
Penalty Mail .....	..	..	480,408:	..	..	..	..	..	..	..	..	..	..	..	480,408	..	..
Unobligated balance .....	..	..	-4,408:	..	..	..	..	..	..	..	..	..	..	..	-4,408	..	..
Subtotal .....	..	..	476,000:	..	..	..	..	..	..	..	..	..	..	..	476,000	..	..
TOTAL	81,078,348:	24,483,563:	109,066,000:	9,500,000:	16,360,000:	16,273,000:	15,000,000:	1,500,000:	5,000:	1,696,000:	174,395,000

Table 2
Available Funds for Cooperative Research
(In Dollars)

Program/State	: Fiscal Year : 1979 Actual	Fiscal Year : 1980 Estimate	Fiscal Year : 1981 Estimate
1. Payments under the Hatch Act:	:	:	:
a. Distributed by formula:	:	:	:
Alabama	\$2,002,579:	\$2,148,570:	\$2,258,769
Alaska	543,016:	585,915:	618,136
Arizona	734,336:	792,419:	836,513
Arkansas	1,692,765:	1,820,904:	1,918,182
California	2,127,981:	2,297,623:	2,426,408
Colorado	966,572:	1,047,665:	1,109,227
Connecticut	828,012:	898,627:	951,949
Delaware	582,079:	627,358:	661,732
District of Columbia	95,346:	366,431:	393,142
Florida	1,328,610:	1,443,727:	1,531,119
Georgia	2,177,903:	2,343,918:	2,469,949
Guam	237,855:	497,322:	526,285
Hawaii	594,840:	637,787:	670,208
Idaho	895,200:	971,930:	1,030,180
Illinois	2,588,116:	2,837,118:	3,021,304
Indiana	2,345,703:	2,569,985:	2,740,251
Iowa	2,431,906:	2,668,231:	2,847,639
Kansas	1,541,601:	1,679,254:	1,783,704
Kentucky	2,453,457:	2,667,233:	2,829,287
Louisiana	1,562,474:	1,685,638:	1,779,139
Maine	814,565:	878,162:	926,442
Maryland	1,112,486:	1,206,675:	1,278,179
Massachusetts	977,861:	1,057,818:	1,118,518
Michigan	2,408,627:	2,627,446:	2,793,564
Minnesota	2,308,001:	2,530,848:	2,700,024
Mississippi	2,101,432:	2,252,086:	2,366,456
Missouri	2,270,844:	2,471,803:	2,624,362
Montana	853,559:	926,814:	982,426
Nebraska	1,412,582:	1,541,623:	1,639,586
Nevada	534,298:	575,882:	607,451
New Hampshire	652,901:	705,100:	744,727
New Jersey	958,856:	1,038,954:	1,099,761
New Mexico	761,928:	821,634:	866,960
New York	2,363,326:	2,571,193:	2,728,997
North Carolina	3,279,037:	3,547,043:	3,750,501
North Dakota	1,073,834:	1,168,135:	1,239,725
Ohio	2,845,507:	3,104,796:	3,301,637
Oklahoma	1,503,116:	1,625,313:	1,718,080
Oregon	1,113,871:	1,209,231:	1,281,625
Pennsylvania	2,890,166:	3,140,672:	3,330,846
Puerto Rico	2,293,891:	2,470,393:	2,604,386
Rhode Island	543,363:	584,907:	616,296
South Carolina	1,743,324:	1,871,366:	1,968,570
South Dakota	1,091,714:	1,190,120:	1,264,826
Tennessee	2,420,840:	2,619,440:	2,770,208
Texas	3,076,026:	3,323,980:	3,512,216
Utah	673,682:	725,723:	765,230
Vermont	697,925:	754,327:	797,047
Virginia	2,083,891:	2,251,169:	2,378,159
Virgin Islands	158,220:	489,512:	517,906
Washington	1,271,940:	1,380,999:	1,463,792
West Virginia	1,350,691:	1,450,062:	1,525,500
Wisconsin	2,319,330:	2,541,165:	2,709,573
Wyoming	626,221:	676,302:	714,289
Subtotal	80,318,206:	87,918,348:	93,110,988
b. Regional research funds a/ Committee of Nine travel	24,442,971:	26,846,563:	28,649,563
Total agricultural research under the Hatch Act	6,863:	12,000:	12,000
For administration	104,768,040:	114,776,911:	121,772,551
For penalty mail	2,543,862:	3,313,089:	3,529,449
Subtotal	480,408:	476,000:	476,000
	107,792,310:	118,566,000:	125,778,000

Program	: Fiscal Year : Fiscal Year : Fiscal Year
	: 1979 Actual : 1980 Estimate: 1981 Estimate
2. Cooperative forestry research:	: : :
Research program <u>b/</u>	\$9,500,000 : \$9,700,000 : \$10,287,820
For administration	<u>--</u> : 300,000 : 318,180
Subtotal	9,500,000 : 10,000,000 : 10,606,000
3. Payments to 1890 colleges & Tuskegee Institute:	: : :
Research program	15,869,200 : 17,251,450 : 18,300,990
For administration	<u>490,800</u> : 533,550 : 566,010
Subtotal	16,360,000 : 17,785,000 : 18,867,000
4. Special research grants:	: : :
Research program	15,719,810 : 17,167,060 : 15,335,700
For administration	<u>488,190</u> : 530,940 : 474,300
Subtotal	<u>c/</u> 16,208,000 : <u>d/</u> 17,698,000 : <u>d/</u> 15,810,000
5. Competitive research grants:	: : :
Research program	14,549,976 : 15,520,000 : 24,250,000
For administration	<u>450,000</u> : 480,000 : 750,000
Subtotal	14,999,976 : 16,000,000 : 25,000,000
6. Rural development research:	: : :
Research program	1,440,000 : 1,440,000 : --
For administration	<u>60,000</u> : 60,000 : --
Subtotal	1,500,000 : 1,500,000 : --
7. Animal health and disease research:	: : :
Research program	4,800,000 : 5,760,000 : --
For administration	<u>200,000</u> : 240,000 : --
Subtotal	5,000,000 : 6,000,000 : --
8. Federal administration (direct appropriation) .	1,676,806 : 1,496,000 : 1,712,000
	: : :
Unobligated balance	1,357,908 : -- : --
Subtotal, appropriated funds	174,395,000 : 189,045,000 : 197,773,000
Reimbursements	124,385 : 1,500,000 : 1,000,000
Allotments from:	: : :
Forest Service	1,072,288 : 919,700 : 919,700
Environmental Protection Agency	<u>350,000</u> : -- : --
	: : :
Total available or estimate	175,941,673 : 191,464,700 : 199,692,700

- a/ Allotted to States on the basis of recommendation by a committee of experiment station directors and approved by Cooperative Research.
- b/ Apportioned among the States on a basis determined by the Secretary after consultation with a national advisory board of not less than seven officials of forestry schools selected by eligible institutions.
- c/ Includes \$500,000 for alcohol fuels research grants in accordance with section 1419 of Public Law 95-113.
- d/ Includes \$500,000 for alcohol fuels research grants in accordance with section 1419 of Public Law 95-113 and \$650,000 for research authorized by the Native Latex Commercialization and Economic Development Act of 1978.

Table 3

Estimated Distribution by Research Programs of Federal Payments to State Agricultural Experiment Stations, Schools of Forestry, Colleges of Veterinary Medicine, and 1890 Land-Grant Institutions and Tuskegee Institute
(In thousands of dollars)

	<u>Fiscal Year</u> <u>1980 Estimate</u>
Natural Resources Programs	
Soil and land use	\$5,461
Water and watersheds <u>1/</u>	1,563
Environmental quality	5,566
Fish and wildlife	766
Outdoor recreation	626
Weather	625
Remote sensing	59
Forestry Resources Programs	
Forestry <u>2/</u>	11,613
Crop Resources Programs	
Protection from disease, insect pests, and weeds <u>3/</u>	22,691
Crop varieties and production systems for dependable and efficient production	43,082
Quality improvement, quality maintenance, and marketing of crops ..	7,335
Animal Resources Programs	
Meat animal research	23,548
Dairy research	10,893
Poultry research	7,269
Other animal research	2,167
Aquatic foods and feedstuffs	1,413
Quality improvement, quality maintenance, and marketing of animal products	4,766
People, Communities, and Institutions Resources Programs	
Food and nutrition	9,270
Food safety	2,473
Rural development	11,173
Insects affecting man	491
Competition, Trade Adjustments and Price and Income Policy	
Farm adjustments necessary to increase farm income	3,083
Marketing and competition	5,682
Penalty Mail	476
Federal administration	<u>6,954</u>
TOTAL	<u><u>189,045</u></u>

1/ Includes water pollution.

2/ McIntire-Stennis funds are also included under other appropriate resource programs.

3/ Includes activities to reduce or avoid the use of pesticides.

Table 4
Available Funds for McIntire-Stennis Cooperative Forestry Research
(In Dollars)

<u>State</u>	<u>Fiscal Year 1979 Actual</u>	<u>Fiscal Year 1980 Estimate</u>	<u>Fiscal Year 1981 Estimate</u>
Alabama	\$317,675	\$324,115	\$342,967
Alaska	130,833	152,409	162,251
Arizona	124,605	165,128	175,637
Arkansas	292,763	305,037	322,888
California	323,904	330,475	349,660
Colorado	149,518	133,330	142,171
Connecticut	99,693	107,893	115,398
Delaware	56,096	57,017	61,853
Florida	255,395	247,801	262,649
Georgia	330,132	336,834	356,353
Guam	- -	- -	- -
Hawaii	74,781	69,736	75,239
Idaho	211,798	228,723	242,569
Illinois	180,658	184,206	195,716
Indiana	161,974	158,768	168,944
Iowa	112,149	101,533	108,705
Kansas	81,009	88,814	95,318
Kentucky	205,570	209,644	222,490
Louisiana	298,991	292,318	309,501
Maine	274,079	298,677	316,195
Maryland	143,289	126,971	135,478
Massachusetts	137,061	120,611	128,784
Michigan	286,535	285,958	302,808
Minnesota	230,482	241,442	255,955
Mississippi	305,219	317,756	336,274
Missouri	224,254	216,004	229,183
Montana	193,114	196,925	209,103
Nebraska	68,553	63,376	68,546
Nevada	49,868	50,657	55,160
New Hampshire	174,430	158,768	155,558
New Jersey	105,921	114,252	122,091
New Mexico	118,377	139,690	148,864
New York	261,623	266,880	282,728
North Carolina	311,447	311,396	329,581
North Dakota	37,412	37,938	41,772
Ohio	186,886	190,566	202,409
Oklahoma	155,746	171,487	182,330
Oregon	342,588	349,553	369,740
Pennsylvania	242,939	254,161	269,342
Puerto Rico	- -	- -	- -
Rhode Island	43,640	44,298	48,466
South Carolina	249,167	260,520	276,035
South Dakota	62,325	76,095	81,932
Tennessee	218,026	222,363	235,876
Texas	267,851	279,599	296,115
Utah	93,465	95,174	102,012
Vermont	168,202	177,847	189,023
Virginia	280,307	273,239	289,421
Virgin Islands	- -	- -	- -
Washington	336,360	343,194	363,046
West Virginia	199,342	203,285	215,797
Wisconsin	236,711	235,082	249,262
Wyoming	87,237	82,455	88,625
Subtotal	9,500,000	9,700,000	10,287,820
Federal administration (3%)	- -	300,000	318,180
TOTAL	9,500,000	10,000,000	10,606,000

Table 5
Payments to 1890 Colleges and Tuskegee Institute
(In Dollars)

	Fiscal Year 1979 <u>Actual</u>	Fiscal Year 1980 <u>Estimate</u>	Fiscal Year 1981 <u>Estimate</u>
ALABAMA			
Alabama A&M University	\$990,037	\$1,063,419	\$1,120,331
Tuskegee Institute	970,361	1,043,772	1,100,682
ARKANSAS			
University of Arkansas at Pine Bluff.	845,049	910,103	960,518
DELAWARE			
Delaware State College	355,956	377,006	393,418
FLORIDA			
Florida A&M University	641,880	699,169	743,443
GEORGIA			
Fort Valley State College	1,045,260	1,129,423	1,194,589
KENTUCKY			
Kentucky State University	1,102,248	1,213,531	1,299,361
LOUISIANA			
Southern University	771,624	833,416	881,266
MARYLAND			
University of Maryland -			
Eastern Shore	560,494	607,031	643,044
MISSISSIPPI			
Alcorn State University	1,028,148	1,104,983	1,164,563
MISSOURI			
Lincoln University	1,014,068	1,118,759	1,199,478
NORTH CAROLINA			
North Carolina A&T State University .	1,454,348	1,593,001	1,700,037
OKLAHOMA			
Langston University	744,029	806,205	854,313
SOUTH CAROLINA			
South Carolina State College	859,378	923,514	973,249
TENNESSEE			
Tennessee State University	1,108,354	1,211,119	1,290,486
TEXAS			
Prairie View A&M College	1,400,656	1,529,257	1,628,596
VIRGINIA			
Virginia State College	977,310	1,062,508	1,128,382
Other	<u>--</u>	<u>25,234</u>	<u>25,234</u>
Subtotal	<u>15,869,200</u>	<u>17,251,450</u>	<u>18,300,990</u>
Federal administration (3%)	<u>490,800</u>	<u>533,550</u>	<u>566,010</u>
TOTAL	<u><u>16,360,000</u></u>	<u><u>17,785,000</u></u>	<u><u>18,867,000</u></u>

Table 6
Payments to States - Title V, Rural Development Act of 1972
(In Dollars)

<u>State</u>	Fiscal Year 1979	Fiscal Year 1980
	<u>Actual</u>	<u>Estimate</u>
Alabama	\$27,948	\$27,948
Alaska	7,340	7,340
Arizona	10,478	10,478
Arkansas	24,529	24,529
California	32,862	32,862
Colorado	15,092	15,092
Connecticut	12,920	12,920
Delaware	7,908	7,908
Florida	21,925	21,925
Georgia	32,135	32,135
Hawaii	7,392	7,392
Idaho	14,215	14,215
Illinois	47,489	47,489
Indiana	43,813	43,813
Iowa	83,716	46,216
Kansas	26,419	26,419
Kentucky	41,640	41,640
Louisiana	23,537	23,537
Maine	11,585	11,585
Maryland	17,723	17,723
Massachusetts	14,871	14,871
Michigan	42,727	42,727
Minnesota	43,516	43,516
Mississippi	66,546	29,046
Missouri	39,131	39,131
Montana	13,518	13,518
Nebraska	24,703	24,703
Nevada	7,166	7,166
New Hampshire	9,298	9,298
New Jersey	14,898	14,898
New Mexico	10,802	10,802
New York	78,037	40,537
North Carolina	52,593	52,593
North Dakota	17,737	17,737
Ohio	50,843	50,843
Oklahoma	23,336	23,336
Oregon	55,455	17,955
Pennsylvania	49,096	49,096
Puerto Rico	34,225	34,225
Rhode Island	7,119	7,119
South Carolina	24,517	24,517
South Dakota	18,560	18,560
Tennessee	38,662	38,662
Texas	48,565	48,565
Utah	9,264	9,264
Vermont	10,114	10,114
Virginia	32,386	32,386

<u>State</u>	Fiscal Year 1979 <u>Actual</u>	Fiscal Year 1980 <u>Estimate</u>
Washington	\$20,705	\$20,705
West Virginia	18,765	18,765
Wisconsin	43,317	43,317
Wyoming	<u>8,862</u>	<u>8,862</u>
Subtotal	1,440,000	1,290,000
 Federal administration (4%)	60,000	60,000
 10 percent to finance work in 2 or more States	<u>a/</u>	150,000
 TOTAL	<u>1,500,000</u>	<u>1,500,000</u>

a/ Regional research reflected in Iowa, Mississippi,
New York, and Oregon.

Table 7
 Grants for Agricultural Research
 Public Law 89-106
 (In dollars)

<u>State</u>		Fiscal Year 1979 Grants Awarded
	Special Research Grants	Competitive Research Grants
Alabama	\$273,502	- -
Alaska	46,062	- -
Arizona	7,168	\$184,500
Arkansas	335,546	94,000
California	963,325	1,700,000
Colorado	324,375	305,400
Connecticut	43,791	- -
Delaware	91,316	- -
District of Columbia	- -	487,900
Florida	160,250	316,000
Georgia	650,766	69,100
Guam	4,036	- -
Hawaii	47,974	- -
Idaho	306,406	- -
Illinois	389,812	1,040,000
Indiana	595,467	355,000
Iowa	1,242,532	328,076
Kansas	108,436	205,000
Kentucky	156,232	133,000
Louisiana	215,697	350,000
Maine	38,552	- -
Maryland	5,883	249,000
Massachusetts	115,367	681,000
Michigan	657,422	971,000
Minnesota	788,217	317,500
Mississippi	85,508	35,000
Missouri	574,609	394,000
Montana	204,304	110,000
Nebraska	309,435	360,000
Nevada	25,853	- -
New Hampshire	37,900	- -
New Jersey	418,343	130,000
New Mexico	16,133	- -
New York	774,396	1,388,000
North Carolina	98,142	580,500
North Dakota	32,136	55,000
Ohio	811,136	358,000
Oklahoma	300,737	85,000
Oregon	753,383	80,000
Pennsylvania	576,391	390,000
Puerto Rico	48,233	- -
Rhode Island	217,529	125,000
South Carolina	32,908	60,000
South Dakota	7,307	- -
Tennessee	415,649	100,000
Texas	494,289	613,000
Utah	20,627	250,000

<u>State</u>	<u>Fiscal Year 1979 Grants Awarded</u>	
	<u>Special Research Grants</u>	<u>Competitive Research Grants</u>
Vermont	\$37,637	\$200,000
Virginia	183,641	268,000
Virgin Islands	4,071	--
Washington	425,682	452,000
West Virginia	36,698	--
Wisconsin	622,247	655,000
Wyoming	101,752	75,000
Unobligated balance	<u>65,000</u>	<u>24</u>
Subtotal	15,299,810	14,550,000
Federal administration (3%)	<u>473,190</u>	<u>450,000</u>
TOTAL	<u>15,773,000</u>	<u>15,000,000</u>

Alcohol Fuels Research, Section 1419, P.L. 95-113

Alabama	\$90,000
Georgia	70,000
Indiana	53,899
Maryland	49,053
New Jersey	103,535
New York	<u>118,513</u>
Subtotal	485,000
Federal administration (3%)	<u>15,000</u>
TOTAL	<u>500,000</u>

Table 8
Animal Health and Disease Research
Section 1433, P.L. 95-113
(In Dollars)

<u>State/Recipient</u>	Fiscal Year <u>1979 Actual</u>	Fiscal Year <u>1980 Estimate</u>
ALABAMA-Agricultural Experiment Station	\$85,549	\$104,005
ALABAMA-Auburn University, Sch. Vet. Medicine	14,681	27,320
ALABAMA-Tuskegee Institute, Sch. Vet. Medicine	30,054	24,325
ALASKA-Agricultural Experiment Station	8,016	9,602
ARIZONA-Agricultural Experiment Station	54,156	66,874
ARKANSAS-Agricultural Experiment Station	68,868	83,340
CALIFORNIA-Agricultural Experiment Station	59,844	218,204
CALIFORNIA-School of Veterinary Medicine	212,292	85,821
COLORADO-Agricultural Experiment Station and College of Veterinary Medicine	124,800	232,980
CONNECTICUT-Agricultural Experiment Station	11,928	16,840
DELAWARE-Agricultural Experiment Station	11,148	14,901
FLORIDA-Agricultural Experiment Station	76,232	94,598
FLORIDA-College of Veterinary Medicine	12,052	14,011
GEORGIA-Agricultural Experiment Station	43,330	46,979
GEORGIA-College of Veterinary Medicine	111,302	130,171
HAWAII-Agricultural Experiment Station	7,752	8,481
IDAHO-Agricultural Experiment Station	58,175	73,323
IDAHO-College of Veterinary Medicine	23,845	27,517
ILLINOIS-Agricultural Experiment Station	56,076	(200,909
ILLINOIS-College of Veterinary Medicine	124,620	(
INDIANA-Agricultural Experiment Station	8,381	(131,077
INDIANA-School of Veterinary Medicine	104,695	(
IOWA-Agricultural Experiment Station	30,634	35,405
IOWA-College of Veterinary Medicine	250,322	311,942
KANSAS-Agricultural Experiment Station and College of Veterinary Medicine	157,716	194,993
KENTUCKY-Agricultural Experiment Station	91,668	107,071
LOUISIANA-Agricultural Experiment Station	87,973	101,978
LOUISIANA-College of Veterinary Medicine	4,127	11,486
MAINE-Agricultural Experiment Station	17,316	23,455
MARYLAND-Agricultural Experiment Station	56,469	64,442
MARYLAND-John Hopkins University	14,499	15,787
MASSACHUSETTS-Agricultural Experiment Station	19,440	23,705
MICHIGAN-Agricultural Experiment Station and College of Veterinary Medicine	138,120	148,301
MINNESOTA-Agricultural Experiment Station	44,062	81,970
MINNESOTA-College of Veterinary Medicine	123,770	125,357
MISSISSIPPI-Agricultural Experiment Station and College of Veterinary Medicine	56,712	75,867
MISSOURI-Agricultural Experiment Station	(130,920	75,175
MISSOURI-College of Veterinary Medicine .....	(	87,841
MONTANA-Agricultural Experiment Station	91,956	106,421
NEBRASKA-Agricultural Experiment Station	147,648	180,942
NEVADA-Agricultural Experiment Station	28,620	30,751
NEW HAMPSHIRE-Agricultural Experiment Station	16,512	16,872
NEW JERSEY-Agricultural Experiment Station	26,004	31,407
NEW MEXICO-Agricultural Experiment Station	39,264	49,104
NEW YORK-Agricultural Experiment Station	24,734	24,621
NEW YORK-College of Veterinary Medicine	181,522	203,053
NORTH CAROLINA-Agricultural Experiment Station	117,576	125,158
NORTH DAKOTA-Agricultural Experiment Station	58,764	67,213

<u>State/Recipient</u>	<u>Fiscal Year 1979 Actual</u>	<u>Fiscal Year 1980 Estimate</u>
OHIO-Agricultural Experiment Station	\$86,789	\$98,576
OHIO-College of Veterinary Medicine	56,227	51,921
OKLAHOMA-Agricultural Experiment Station	130,158	148,637
OKLAHOMA-College of Veterinary Medicine	4,002	6,145
OREGON-Agricultural Experiment Station	44,287	58,795
OREGON-School of Veterinary Medicine	47,045	54,644
PENNSYLVANIA-Agricultural Experiment Station	60,428	67,793
PENNSYLVANIA-Lehigh University	2,549	2,791
PENNSYLVANIA-School of Veterinary Medicine	62,399	74,501
PUERTO RICO-Agricultural Experiment Station	7,164	19,280
RHODE ISLAND-Agricultural Experiment Station	12,684	12,199
SOUTH CAROLINA-Agricultural Experiment Station	25,704	28,671
SOUTH DAKOTA-Agricultural Experiment Station	101,676	118,702
TENNESSEE-Agricultural Experiment Station and College of Veterinary Medicine	64,812	73,301
TEXAS-Agricultural Experiment Station and College of Veterinary Medicine	362,604	425,692
UTAH-Agricultural Experiment Station	34,476	52,768
VERMONT-Agricultural Experiment Station	16,752	19,305
VIRGINIA-Agricultural Experiment Station and College of Veterinary Medicine	70,956	85,377
WASHINGTON-Agricultural Experiment Station	35,975	37,457
WASHINGTON-College of Veterinary Medicine	71,557	94,349
WEST VIRGINIA-Agricultural Experiment Station	17,652	21,579
WISCONSIN-Agricultural Experiment Station	176,148	225,816
WYOMING-Agricultural Experiment Station	<u>43,812</u>	<u>50,106</u>
 Subtotal	 4,800,000	 5,760,000
 Federal administration (4%)	 <u>200,000</u>	 <u>240,000</u>
 TOTAL	 <u><u>5,000,000</u></u>	 <u><u>6,000,000</u></u>

PAYMENTS UNDER THE HATCH ACT

The Hatch program of research at the State agricultural experiment stations is aimed at improving rural living conditions and promoting efficient production, marketing, distribution, and utilization of crops and livestock that are essential to the food supply or health and welfare of the people of the United States.

The following is a description of current activities and selected examples of accomplishments from these appropriated funds:

1. Natural Resources

Current activities: 10 percent of total Hatch funds for research. Included are soil and land use, water and watersheds, outdoor recreation, environmental quality, fish and wildlife, and remote sensing.

Selected examples of recent progress:

More Accurate Sediment Runoff Prediction. Ways of predicting the effectiveness of measures to reduce the sediment in streams and reservoirs in surface mining regions have been worked out by scientists at the Kentucky Agricultural Experiment Station. This ability to predict has been vital to Federal agencies such as the Office of Surface Mining and the Environmental Protection Agency in their evaluation of sediment control plans. This research has also been useful in the design of sedimentation ponds for control of runoff on strip-mined lands.

2. Forestry Resources

Current activities: 2 percent of total Hatch funds for research. Forestry related research under Hatch is closely coordinated with the Mc-Intire-Stennis Cooperative Forestry Research program which has similar research objectives. The Hatch forestry research program is characterized by a higher degree of multi-institutional or regional projects.

Selected examples of recent progress:

Efficient Heating from Waste Wood. Maine Agricultural Experiment Station engineers have developed highly efficient wood-burning test furnaces for home heating that could replace costly oil-fired furnaces. These small-scale automatic control furnaces use waste wood from timber harvesting operations. They show the potential for replacing up to 300 million gallons of #2 fuel oil used in that State each year. Not only would the general use of these furnaces save oil, but their manufacture would create jobs and make better use of all the wood that is harvested.

Petroleum-like Hydrocarbons from Ag Wastes. Conversion of sawdust and other agricultural and forestry wastes to petroleum-like hydrocarbons is possible because of research by a team of scientists at the Rhode Island Agricultural Experiment Station. The process involves heating sawdust to moderate temperatures in the presence of a catalyst. Using biomass instead of coal to produce fuels means that excessive carbon dioxide production or other environmental hazards associated with synthetic fuels derived from coal and other non-renewable resources is avoided because trees accumulate their carbon from the atmosphere and because sulfur content of biomass is very low.

3. Crops Resources

Current activities: 43 percent of total Hatch funds for research. Included under this research program grouping are crop protection and production systems for dependable and efficient production, quality improvement, quality maintenance, product development, and related commodity aspects of marketing of crops.

Selected examples of recent progress:

Saving Energy in Grain Drying. Grain is dried by blowing heated air through stored grain. This is necessary to avoid spoilage. Traditionally, the air for drying the grain has been heated by passing it through electric heaters. A large amount of energy is consumed in this manner. It is possible, however, to heat the air with solar collectors. Research at Iowa State University has shown that a system using solar energy when available, and conventional electric heaters when solar energy is not available, can be reliable and can save about 30 percent of the energy that otherwise would be consumed in a total electrical system. Changeover from one system of heating to the other is accomplished with automatic controls. This integrated heating system, using solar energy, costs about the same as the all-electric system and promises to become increasingly cost competitive as the costs of conventional fuels rise.

Evaluating the Need for Supplemental Irrigation. Kentucky Agricultural Experiment Station scientists have accumulated data about crop growth and weather to the point where they can help farmers decide whether or not they should use supplemental irrigation. A computer program will tell the farmer his chances of making a justifiable return on the extra investment in irrigation equipment and operating expenses. Profitability of such irrigation depends heavily on the amount of water the soil can hold, and this can vary widely from farm to farm and between fields on an individual farm. This kind of an analysis should be useful to farmers that use supplemental water for the production of high return crops by reducing the frequency of irrigation and the quantity of water applied.

Greenhouse Testing for Plant Resistance. University of Missouri scientists have found that plants that are difficult to inoculate with a disease in the greenhouse often show general resistance to that disease in the field. There is not a 1:1 relationship but it is sufficiently close to consider as a breeding tool. This variation in sensitivity to inoculation could provide a way to screen large numbers of plants in the greenhouse during the winter months and so save considerable time and space in the field. The method is also advantageous in plant improvement by reducing generations in developing new varieties. The techniques may be useful in screening for resistance to certain diseases in a number of crops.

Methods to Reduce Energy Requirements for Heating Greenhouses. Scientists at Rutgers University conduct research to help greenhouse operators cope with problems posed by the rapidly rising costs of fuels traditionally used (natural gas, oil) and the real possibility that these fuels will not be available at any price. Substitute energy sources being evaluated are solar energy and waste heat discharged in the condenser cooling water at electric generating plants. Research shows that all heating and cooling requirements can be met by using power plant waste heat. These systems are cost-competitive with fossil fuel sources. Reduction in energy needs is being achieved by the introduction of new concepts of insulation in greenhouses. Innovative research in energy conservation and energy substitution assures the future of the greenhouse industry and contribute substantially to savings of fossil fuels.

Better Nitrogen-Using Corns. Growers will someday have corn varieties that use nitrogen much more efficiently because of research done at the North Carolina Agricultural Experiment Station. Researchers there have found that corn varieties that typically produce two ears to a stalk are more efficient in nitrogen use than those that only produce one ear. Larger amounts of nitrogen moved from the stalk and leaves during grain formation in these more efficient varieties. The two-eared genotype consistently produces more grain at both low and high nitrogen fertilizer rates. This work is particularly important in that the recovery of nitrogen by corn frequently is less than 50 percent of that applied. Poor utilization of nitrogen fertilizer means a waste of money for this critical plant element, and in some cases pollution of surface waters by runoff and leaching.

"Basin Tillage" Increases Dryland Yields. Grain sorghum yield increases of 12 percent and cotton increases of 25 percent have resulted from a new technique called "basin tillage" developed by scientists at the Texas Agricultural Experiment Station. The technique consists of mounds of soil mechanically placed across the furrow to form small basins. When rain falls, it is held in the basin long enough to soak in rather than runoff the land. The technique was developed for use in the dryland farming areas of the Texas high plains. Researchers designed a basin tillage unit that paid for itself in one year with increased yields from about 75 acres of cotton. The unit can be built with readily available materials and with equipment found in most farm shops.

Research Cuts Ammonia Production Costs. Research at the Wisconsin Agricultural Experiment Station on the basic process of nitrogen production has come up with a discovery that makes it possible to produce ammonia without the very high temperatures and pressures now required. The scientists proved that an iron-molybdenum catalyst is the active site of nitrogenase--the enzyme that is important to nitrogen fixation. This research aids chemists in their efforts to synthesize better catalysts for industrial nitrogen fixation. The discovery also should mean less need for fossil fuels for ammonia manufacturing.

Water-Soil-Plant Relations. Subsoiling during cultivation is a common practice in dryland farming operations. This operation breaks up tillage pans that interfere with water and root penetration, and is also widely practiced on irrigated farms. However, deep chiseling during tillage did not improve crops of shallow rooted potatoes even when adequate amounts of water and fertilizer were applied. Water retention of soil above the pans was greater when tillage pans remained intact. Producers of shallow-rooted crops such as potatoes under an irrigation management scheme should carefully evaluate the economics of expensive and energy-consumptive subsoiling tillage practices according to researchers at the Washington Agricultural Experiment Station.

Control of European Corn Borer in Corn. The effectiveness of various formulations of the bacterium Bacillus thuringensis for control of European corn borer in corn and cankerworms in shelterbelts has been established for North Dakota. The bacterium was applied with ground equipment in corn and with ground equipment and aircraft in shelterbelts. The use of the bacterium for insect control greatly reduces environmental contamination and reduction of populations of non-target species, including parasites, predators of pest species, and pollinators. In shelterbelts, effective controls prevent severe defoliation by cankerworms and thus help protect adjacent crops from severe weather stresses. As more constraints are applied to use of conventional chemical control techniques, biological agents will need to be used as a part of integrated management programs. This research represents a search into more possible population suppression agents and techniques which may have future use.

Isolating Superior Strains of Wheat. Oklahoma State University agronomists have developed a method for studying the carbon dioxide used by living plants under field conditions. Measuring the amount of carbon dioxide a wheat plant uses during photosynthesis appears to provide a new tool for screening superior strains for yield and thereby enhancing the development of new wheat varieties for Oklahoma. By measuring plants under stress in the field, the genetically superior plants, that continue to photosynthesize, can be isolated earlier. The theory is, the more a plant produces under stress before shutting down photosynthesis, the more it will grow and produce. The ultimate goal is to develop a wheat plant that can better withstand the more arid portions of the State's wheat growing belt.

Soybeans Resistant to Peanut Root-Knot Nematode. In testing over 17,000 breeding lines and varieties of soybeans, researchers for Clemson University's South Carolina Agricultural Experiment Station have found three varieties resistant to the peanut root-knot nematode, one of which is the variety, "Govan," released by the station last year. The other varieties are "Braxton" and "Wright," which will be released later in 1979 by the Florida and Georgia Experiment Stations, respectively. The three resistant varieties, tested in on-farm plots in an area known to be infested by the nematode, yielded significantly more than susceptible varieties. Also, they showed no yield disadvantages when grown in fields without the nematode.

Disease Resistant Hybrid White Clover Plants. Research at Clemson University's South Carolina Agricultural Experiment Station has successfully produced disease-resistant hybrid white clover plants through the use of tissue culture and cloning. The work is part of an attempt to breed disease and drought resistance into the State's native white clovers, highly prized as a forage crop. Young embryos of two different kinds of clover were grown in callus cultures. One kind is highly tolerant to disease and dry weather, and the other is well-known for its palatability and vigorous growth. The hybrids obtained were somewhere between the two in plant structure and retained the disease resistance of the resistant clovers. The aim of the program is to develop superior cultivars.

Control of Mycotoxin Synthesis. Research at the Virginia Agricultural Experiment Station has uncovered an effective inhibition by the trace metal zinc of several important enzymes in molds that grow on agricultural products. The enzymes in question are important in the life processes of molds that lead to the production of mycotoxins, such as the familiar aflatoxin which is both toxic and carcinogenic. It is known that zinc is required for mycotoxin production in molds. The identification and the study of the properties of enzymes affected by zinc could lead to a chemical approach to the control of mycotoxin synthesis and a reduction in toxic effects of mold contamination on grains used for animal and human consumption.

4. Animal Resources

Current Activities: 27 percent of total Hatch funds for research. Included under this research program grouping are protection, production and management aspects of beef and dairy cattle, swine, sheep, other animals and poultry. It also includes quality improvement, product development, and related commodity aspects of marketing.

Selected examples of recent progress:

Discovery of Viroids in Animals. California Agricultural Experiment Station scientists in cooperation with Wisconsin station scientists have made the first discovery of viroid-like agents in animals. This is the long sought breakthrough in the search for the cause of scrapie, a serious disease of sheep. These same California scientists discovered viroids in plants seven years ago. Viroids are by far the smallest infectious agents ever known. The discovery of viroids in animals is a major scientific advancement in understanding the causes of infectious disease in animals and may have wide implications for solving numerous disease puzzles of both animals and humans. These newly discovered disease-causing agents are as important as viruses or bacteria, and possibly may be the cause of certain scrapie-like diseases of the nervous system in people.

New Test Helps Select Disease-Resistant Chickens. Iowa Agricultural Experiment Station scientists participating in a regional research project have discovered a way of identifying chickens with high genetic resistance to Marek's disease or Rous Sarcoma virus. They have found that chickens with genes which convey resistance can be identified when they are injected with an artificially prepared antigen - GAT. This method of breeding for disease resistance combined with a USDA-Station developed vaccine now saving \$170 million per year will further reduce losses from a disease originally costing over \$200 million a year. It also should help bridge the gap between epidemiology and genetics, not only in poultry and farm animals, but in humans as well.

Animal Research an Aid to Human Investigations. Methods to probe the interior of animal tissues with high frequency sound (ultrasonics) were developed by New York Agricultural Experiment Station scientists to measure the quantity and distribution of fat and muscle in beef carcasses and in live lambs. Using these ultrasonic methods, correlations among fat and muscle composition and lamb size are being developed to chart changes in body composition of human subjects over time. This use of ultrasonics on humans is being further extended to persons with malnutrition and obesity to develop rapid methods for large-scale surveys of body composition. This is an example of how information gained in research on animals has direct application to the study of important human problems.

Pig Power. North Carolina Agricultural Experiment Station research has led to the development of the Autosow and the Autoweaner. These mechanical "helpers" replace the sow with devices for feeding baby pigs. They assure ample supplies of milk and other essential nutrients for baby pigs that cannot be supplied by sows with large litters. These "helpers" have the potential of increasing the yearly sow output from the present average of 15 pigs per year to better than 40, an increase in production of 267 percent. This development has required solution of some very complex problems surrounding the baby pig, but progress is being made at a very rapid rate in assuring success of this procedure.

Improvement of Cattle through Embryo Transfer. Texas Agricultural Experiment Station research has developed effective methods for the nonsurgical collection and transfer of cattle embryos. In contrast to artificial insemination which extends the value of the male a great extension of superior female germ plasm is made feasible by such a process. Multiple ovulation is made to occur in the cow and an average of 3.5 calves are produced from each collection procedure. Embryo transfer companies have been quick to form and it is estimated that 10,000 calves of superior genetic worth are now being produced annually in the U.S. and Canada by such a process.

Energy Savings in Poultry Production. Delaware Agricultural Experiment Station research has found that overventilation of broiler houses can increase fuel consumption by 50 percent. As a result of this research, poultrymen are now closely monitoring ventilation to see that it conforms to the rates the researchers recommend. In addition, the researchers have found certain other practices can reduce fuel consumption in these houses by 3.2 million gallons of LP gas compared with 1973 use levels. The practices includes (1) increasing house width from 32 to 42 feet cuts fuel consumption by 10 percent; (2) increasing ceiling insulation from 3 to 6 inches decreases fuel consumption by 22 percent; (3) limited area breeding reduces fuel consumption by 40 to 60 percent; and (4) efficient motors reduce electrical power use for ventilation by 25 percent. These changes benefit both the poultryman and the consumer.

5. People, Communities, and Institutions

Current Activities: 11 percent of total Hatch funds for research. Included under this research program grouping are food and nutrition, food safety, rural development, and families and consumers.

Selected examples of recent progress:

Mobile Homes Help Meet Housing Needs. Mobile homes appear to be a good alternative housing choice for many rural Ohio families, according to researchers at the Ohio Agricultural Research and Development Center. These units meet the needs of their occupants well. Small families headed by young persons with mid-to-medium incomes find mobile homes a way to have adequate housing at an affordable price. Mobile home households are generally not overcrowded, enjoy many conveniences, and have adequate services. Too, rural mobile home residents as a whole are not transients but tend to stay in one place.

Flame-Retardant Fabric Improvement. Southern regional research involving the cooperative efforts of several States has turned up some interesting results concerning flame-retardant fabrics. One is that adding flame-retardance to fabric may destroy its crease-resistance. Also, it may increase the staining of a fabric. These are problems still to be overcome. The researchers were also concerned with what protection flame-retardant material would give an older person, for example, who might wear flame-retardant-fabric pajamas and yet under them wear other garments for warmth that are not made of flame-retardant material. They found that while the flame-retardant fabric would burn very little, the underclothing could ignite very rapidly.

Vitamin D in Milk. Methods for determining Vitamin D in milk have been expensive and less sensitive than desired. Research at the Connecticut Agricultural Experiment Station resulted in a new method of analysis which is better on both counts. To develop the method, scientists had to overcome the problems of the instability of the vitamin, the complex chemical and physical nature of milk and the fact that a small amount of the vitamin exists. The new method has been used to evaluate the Vitamin D content of the Connecticut milk supply.

Metabolic and Endocrine Regulation of Body Growth and Composition. Improving the growth of lean meat and reducing the accumulation of fat in meat-producing animals is part of the aim of a basic research project at the Pennsylvania Agricultural Experiment Station. One finding is that genetically obese rats and pigs have abnormal levels of certain blood hormones. Depressed blood growth hormone and elevated blood insulin observed in obese animals can increase body fat build-up and reduce lean protein deposition. Knowledge gained from this research may help reduce the estimated \$270 million to \$700 million annual loss to swine and beef producers because of excess carcass fat. It also has potential application in the early detection and treatment of growth abnormalities in man.

Food Fiber Lowers Cholesterol. Two food fibers--wheat bran and hemi-cellulose--as supplements to the diet result in lower blood cholesterol levels, according to research done at the Nebraska Agricultural Experiment Station. To help lower cholesterol levels, many Americans have shifted away from eating animal fats. They tend to increase their carbohydrate intake in order to get the calories needed which increases the blood triglyceride level--possibly creating other types of problems. Either animal or plant fats, eaten in combination with wheat bran and hemicellulose, help to avoid possible alterations of cholesterol or triglyceride levels.

Bodily Needs for More Vitamins. Research at the University of California has given some solid information about how much of certain vitamins humans get from the food they eat. Researchers there studied Vitamin B-6, and pantothenic acid--essential components in metabolism processes. From a typical American diet, they found that 70 to 73 percent of the Vitamin B-6 in the food in that diet was available for use in the human body. With pantothenic acid, the figures were 42 to 61 percent. Their results mean that in order for a person to get an adequate amount of vitamins, the food eaten will have to contain more of the vitamins than actually required to meet the body's needs.

Iron Supplements May be Unnecessary. Research at the Colorado Agricultural Experiment Station has brought into question the belief that women need more iron than do men. One of the beliefs was that iron stores and serum iron in the women's body fluctuate, especially during the menstrual cycle--and so women's diets should contain more iron than should men's. Studies of young women of college age during their menstrual cycle showed this not to be the case. Iron stores and serum iron do not fluctuate during the menstrual cycle. The indication is, then, that a nutritionally balanced diet, based on the recommended dietary allowance, probably supplies sufficient iron for women.

Better Credit-Worthiness Measures. A more accurate way of forecasting the likelihood that a low-income borrower will repay a loan has been worked out by researchers at the Ohio Agricultural Research and Development Center. Loan agencies usually depend on criteria to make these forecasts that do not work with low-income people. One of the best predictors of loan repayment according to the study was the possession of a bank account. Others were home ownership and being in a payroll deduction plan. The study also points to the need for close monitoring of these loans and to the need for household financial consultants for low-income persons seeking or having loans.

Quality Housing Environment for Low-Income Families. Major research areas of a Southern regional research project have included identifying aspirations, needs, satisfactions and expectations of low-income families, as well as identifying barriers to "quality" housing for this group. Researchers developed innovative structural designs including housing components, new combinations of materials, and building techniques such as peripheral heating systems and modular panels. Research was initiated on use of solar energy and methods of conserving energy. Extension worked with research to develop innovative systems for disseminating housing information. Housing workshops have been held for over 200 persons and information has been disseminated by radio and television. More than 4,000 copies of workshop proceedings have been distributed and they have been adopted as a text for courses at four universities. Project data are being utilized for the purposes of planning and requesting Federal and State funds for specific housing and housing-related projects. Energy-efficient housing prototypes have been developed and construction documents made available through publications.

6. Competition, Trade Adjustments, Price and Income Policy

Current activities: 7 percent of total Hatch funds for research. Included under this research program grouping are farm adjustments, prices and income, economic aspects of marketing and competition.

Selected examples of recent progress:

Research to Help Small-Scale Farming. Research on soil management systems for vegetable crops by Maine Agricultural Experiment Station researchers is helping make better use of one of that State's more abundant and valuable natural resources--underused land. This research has helped small farmers there return land to production using diversified units to grow vegetables and small fruits, and raise small flocks of sheep and other livestock. Considerable emphasis is placed on the use of appropriate technology.

Return from Improving Low-Income Farm Management. Research by agricultural economists at the Kentucky Agricultural Experiment Station reveals that over half of the low-income farm families surveyed are receiving public assistance. Improving the efficiency of these farms through moderate improvements in farm management and enterprise reorganization could triple the net family income. At the same time public assistance would be reduced at a net cost saving of \$1,800 per farm family. In addition to a statewide cost saving of nearly \$5 million, the contribution from more efficient farms to the nation's food supply and income would be substantial. The research defines the extent of the problem in Kentucky and provides a means for projecting the social and economic benefits of educational work with low-income farmers.

Social Costs of Rail Rate Structure. Major social costs are resulting from an inefficient rail rate structure, according to research by economists at the Minnesota Agricultural Experiment Station. In the upper midwest, social costs estimated at between \$42 million and \$62 million for wheat and barley alone result since the current system of rail rates cause grain traffic to shift to less efficient transportation modes--mainly long-haul trucking. Another result is a reduction in effective competition between alternate means of transportation. Rail rates on a "cost-of-service" basis would eliminate or greatly reduce these social costs. Research like the University of Minnesota study is important to public decision-makers for assessing the impacts of alternative public policies.

COOPERATIVE FORESTRY RESEARCH

The Cooperative Forestry Research (McIntire-Stennis) program is planned and directed to provide answers to the complex questions that face forest land managers who are seeking to produce an adequate timber supply for home and other construction. Timber production and wood utilization and distribution systems are key elements of forestry research. The research also meets the demands for wildlife production and recreational opportunity on forests, and assuring an acceptable level of environmental quality in relation to all forest operations and uses.

The following is a description of current activities and selected examples of accomplishments from these appropriated funds:

Current activities: The following research program activities encompass the range of research funded under this act:

Multi-resource inventory, appraisal and evaluation. Assessment of supply, growth and demand, new inventory methods, alternative and multiple uses, economic and social benefits.

Forest resource management. Land productivity and forest growth, reproduction of trees and stands, improved varieties, institutional regulations and forest management.

Forest protection. Systems for detection and evaluation of losses to insects and disease; control methods; fire detection, monitoring, and control.

Harvesting, processing, marketing. Energy efficient equipment; environmental concerns; wood properties and uses; biomass for energy; rural development role of forests and forest industry.

Forest watersheds, soils, pollution. Quality, quantity water production; effects of forest management on nutrient cycling, water quality and productivity; effects of sewage disposal; air quality effects, amelioration of air and noise pollution.

Forest range, wildlife, fisheries habitat. Use and effects of grazing, forest-range management, wildlife habitat maintenance, costs and benefits.

Forest recreation and environmental values. Recreation opportunity expansion methods; demand, cost and benefit analyses; environmental quality improvement; effects on forest environment.

Selected examples of recent progress:

Forecasting Forest Growth for Investment. Virginia Agricultural Experiment Station scientists have developed accurate methods for forecasting loblolly pine growth for 2 or 3 decades ahead. Such accurate forecasts are crucial to industries and forest landowners who must decide what further investments to make in growing pine trees. Southeastern United States forests are among the most productive in the world, and loblolly pine is the most important species. With the growing emphasis on biomass energy sources, these forest areas have gained even more in importance--where they already are producing record amounts of paper, lumber, and plywood.

More Wood by Cloning Hardwoods. University of Georgia scientists have developed techniques and methods for cloning hardwoods for use in high intensive, short-rotation plantations. They have been able to successfully clone black locust, honey locust, sweetgum, and tulip poplar. This means they have been able to identify the most productive and fast-growing trees and then propagate planting stock with the same characteristics as the originals. The scientists have also been studying several nitrogen-fixing species. These latter could be mixed in with non-legume trees such as sweetgum and sycamore and help increase the biomass produced in such plantings.

Drought-Resistant Seedlings Survive Best. The discovery that some trees show drought resistance where others of the same kind do not, led Nevada Agricultural Experiment Station scientists to one solution for reestablishing forests in that dry State. Seedlings from parent trees growing on dry sites had superior root development, giving them a definite survival advantage. This careful selection of Jeffrey pine seed sources increases survival of the seedlings and thus reduces forest regeneration costs. Without the drought-resistant seedlings, Jeffrey pine forests often require repeated plantings over several years.

Impact of Mountain Pine Beetle Can be Predicted. Idaho scientists have developed methods for evaluating the impact of the mountain pine beetle throughout the range of lodgepole pine. Based on insect population and forest stand and management decision models, equations have been developed which can directly predict the expected level of tree mortality should an infestation occur in a given stand. This research has been concentrated on the probable impacts of beetle infestations on two major forest uses--recreation and water.

Wood Products Costs Will Continue to Rise. Predictions from an Oregon State University study are that prices of wood products will continue to rise in this country faster than the average price of all commodities. And this trend will continue for at least the next five decades. This same trend took place during the past 75 years. Increasing the timber harvest from public lands would significantly impact local economics, but it would have little effect on national price trends and consumption. The greatest hope is for increased intensity of forest management on private lands. But the curbing of price growth even with that increase would be effective only some 20-50 years hence--and would be relatively ineffective before the year 2000.

Energy Self-Sufficiency for Wood Product Companies. Wood product industries can almost totally eliminate fossil-fuel costs according to research done at the Texas Agricultural Experiment Station. The process involves using and reusing the incoming wood materials. A part of the raw material is used in manufactured products. Another part is used as fuel for process steam and electricity. Residues from the manufacturing process are also used as fuel. Some of the wood manufacturing processes that provide enough residue for this self-sufficiency include softwood lumber, oak flooring, lumber made from veneer, and both hardwood panel and softwood sheathing plywood.

Reclaiming Strip-Mined Land. Eliminating highwall, blending spoil material and replacing topsoil is a good way to reclaim strip-mined land, according to research done at the West Virginia Agriculture and Forestry Experiment Station. The researchers there got much better results with that method than with the usual procedure of leaving a partial highwall and back-filling with mixed overburden. This latter method produces grass cover, but the native vegetation does not come back. The preferred method results in an annual increase of native plants, and normal decomposition. It also accelerates the successional development that leads to forest cover--the preferred vegetation. Forest reestablishment frequently is a requirement for the certification of completed reclamation on strip-mined lands.

Forests Handle Effluent Well. University of Georgia scientists have found that they can put high rates of municipal sewage effluent on steep forest slopes with beneficial effects. The effluent has been purified by the soil and trees to the extent that ground water suitable for drinking has been produced. Communities in mountainous areas now have a larger land base from which to select sites for land treatment of sewage effluent, since steep slopes can now be considered.

Forest Wetlands Habitat for Wood Ducks. A Missouri study of forest wetlands management for wildlife habitat use discovered that the pin-oak forest zone, where a leaf layer is flooded in the spring, produces the quantities of protein food required by wood ducks for production of eggs. The invertebrates produced in the flooded areas assure duck reproduction. This information is essential to successful management of forest resources through the National Clean Water Act.

Public Support for Both Recreation and Harvesting of Forests. Southern Illinois University interviews with nearly 400 recreationists at Land Between the Lakes found that almost all were favorable to forest harvest in recreational areas. Winter users of the areas were more opposed to harvest than were users at other times of the year. However, this research indicates that timber harvest can coincide with recreational activities in areas managed for multiple use--thus opening more acres to supply America's timber needs.

1890 COLLEGES AND TUSKEGEE INSTITUTE

The program of research at the 1890 Colleges and Tuskegee Institute places emphasis in the research areas of human nutrition, rural development and quality of living, and limited resource farmers.

The following is a description of current activities and selected examples of accomplishments from these appropriated funds:

Current activities: During the period from 1967 through 1978, the 1890 Colleges and Tuskegee Institute were receiving funds for research under the authority of Public Law 89-106, which is a grant authority to award grants of 5-year duration. The grant authority had some limitations that imposed some hardships on developing a continuing agricultural research program. In general, this limitation did not provide for flexibility in handling unforeseen problems that may occur in a research program. At the present time there are 374 active Public Law 89-106, 5-year research grants that support research projects being conducted at these institutions. These existing grants will be carried through to termination by the end of fiscal year 1982. The grants program will continue to be supervised to completion in the usual manner through administrative reviews, special reviews, and the submission of annual progress reports.

A formula funded research program for the 1890 Colleges and Tuskegee Institute was established in the Food and Agriculture Act of 1977. Section 1445 authorized annual appropriations to support continuing agricultural research at the 1890 Colleges and Tuskegee Institute and funds were appropriated in 1979 to initiate this continuing program of research.

Guidance from the agency has been provided to institutions in the implementation of the formula funded program. This assistance has been in the form of workshops, conferences, development of administrative guideline manuals, and individual campus visits. The implementation has gone very well. All the comprehensive State plans for the research coordinated under this new authorization for these 17 institutions and under the Hatch Act for the sister 1862 land-grant universities in the same States were completed and approved by SEA.

During the first year of operation with funds appropriated under Section 1445, the institutions allocated funds to support research projects under their on-going Public Law 89-106 grant supported research programs and for the renovation of some research laboratories.

The research projects currently being conducted in the 1890 Colleges and Tuskegee Institute are distributed into several research programs as follows: 11 percent, natural resources; 27 percent, crops resources; 18 percent, animal resources; 38 percent, people, communities and institutions; and 6 percent, competition, trade adjustments, price and income policy.

Selected examples of recent progress:

Supplementary Calcium May Alleviate Osteoporosis. According to researchers at Kentucky State University, at least one half of a group of elderly females with osteoporosis showed increases in bone density during a six month study in which supplementary intake of calcium and cheese was a factor. Eighty to 85 percent of elderly females in the U.S. have varying degrees of osteoporosis. Many physicians and some of the general public believe that the intake of calcium-rich foods has little benefit in prevention and/or treatment of osteoporosis. However, these findings are an important counter to such beliefs.

Tenant Purchase Plan Promotes Land Ownership. The Tenant Purchase Program of the Farm Security Administration helped to create a corps of independent Black landowners in Claiborne County, Mississippi, according to a survey being conducted by researchers at Alcorn State University. The program, which provided low-interest, long-term mortgages, coupled with farm and home supervision, for selected renters and sharecroppers between 1939 and 1945, settled 24 families on farms of 60-150 acres. All mortgages have been repaid, over 75 percent of the farms continue to be owned by the original purchasers or their heirs, and additional homesites have been provided for approximately 60 families through subdivision. Participants report that the opportunity to acquire land equity was a pivotal factor in their lives, and detailed case histories are being assembled in an attempt to assess the total impact of the program on the economic, political, and social fabric of the county.

Record Keeping Program for Small Farmers. Inadequate enterprise records and the lack of use of farm records in decision-making are persistent among small farmers, according to an agricultural economist at Southern University (Baton Rouge). A pilot record keeping and management program has been initiated among fifty small farmers in the State. The program has been received very well among the participating farmers. These farmers have expressed an interest in and a need for farm records. A small farm family record book has been developed to meet the specific needs of these farmers. The record book is designed to encompass both the farm and household as an interdependent decision-making unit.

Rabbit Meat Is a Good Food Source. Alabama A&M scientists report that rabbits have a high meat-to-bone ratio and more efficient food conversion than other livestock. The meat is high protein and low in fat content. This is important in a world where people often have too little protein. Rabbits' growth rate is comparable to that of modern broiler chickens. Preliminary analysis indicates that rabbit meat is also a good source of B vitamins and is low in cholesterol. Studies such as this form the basis for wider consumer acceptance of alternate animal protein sources and provide additional opportunity for small farm income.

Culture of Virginia Pine for Christmas Trees. A special cultivar of Virginia pine selected and multiplied from practical stock in West Jefferson County, Alabama, has been investigated for Christmas tree use. The needed cultural and management practices have been developed to produce dense well-formed Christmas trees. The recommended practices included: Choice of well drained sites, cultivation, planting of year-old stock 1 inch deeper than position in the nursery, staking of trees which lean, weed control by herbicides and mowing, shearing in April and May (after 1 foot of growth), touch up shearing in mid-July, spray control of tip moth, and colorant spray in early November of the harvest year.

Mercury Contamination Not a Problem. South Carolina research on mercury residues in 75 saltwater fish samples from the Atlantic Coast of the State showed that mercury contamination presents no problem to the State's fisheries. All fish analyzed contained mercury levels below the currently accepted guideline of 0.5 parts per million. Thus, fish from that area are relatively safe for human consumption so far as mercury contamination is concerned.

Rock-crab Farming. Research underway at the University of Maryland, Eastern Shore, may help crab farming become a mid-Atlantic industry modeled on the poultry industry's broiler house concept. Commercially grown rock crabs can be an alternative to the popular blue crab which is declining in population because of heavy fishing. Scientists at Eastern Shore have successfully grown rock crabs in laboratory tanks simulating their natural environment for periods of more than a year. Experiments with special diets and 21-hour lighting to stimulate 24-hour growth have promoted body growth.

Economics Not the Whole Picture with Low-Income Families. A combination of psychological alienation and the social structure factors of race and education most significantly affect level of income, and ultimately, one's ability to escape poverty. These were key findings from a Fort Valley State College study of 730 middle Georgia household heads. The need, the researchers say, is for programs designed to reduce long-term impoverishment to focus more on the elimination of these psychological and structural barriers to achievement, in addition to providing economic assistance. In addition, the study found that the factors that affect levels of participation in organizations are different for the poor and others in that area--with the poor feeling more powerless to affect or control events in their lives. This isolation from the rest of society will have to be reduced if the poor are to participate more in the mainstream of society, the researchers feel.

SPECIAL RESEARCH GRANTS

This program of Special Research Grants provides special concentration on problems of national interest where such concentration is desirable or necessary beyond the normal emphasis in the formula grant program.

The following is a description of current activities and selected examples of accomplishments from these appropriated funds:

Current activities: In fiscal year 1980 under the Special Research Grants program, grants will be made to the four regional leader laboratories and the headquarters laboratory to continue the pesticide clearance research program (New York, Michigan, Florida, New Jersey, California), and to continue the on-going pesticide impact assessment program. Each of the agricultural experiment stations in Idaho, Oregon, and Washington will receive a grant to continue the research on soil erosion supported under this authorization. Each institution operating one of the four regional rural development centers will receive a grant to continue this program of research (Iowa, Oregon, New York, Mississippi). A grant involving 16 participating states will also be made to continue the program of research in food and agriculture policies.

Grants will be made to designated institutions for specific areas of research as identified by the Congress: dried beans, North Dakota; soybean cyst nematode, Missouri; mushrooms, Pennsylvania; aquaculture, Mississippi; soil and water, Alaska; bean and beet, Michigan; dairy photoperiod, Michigan; bean flour, Michigan and Texas.

Funds in the amount of \$2,500,000 will provide specific emphasis to areas of high priority agricultural research.

In fiscal year 1980 Special Research Grants will be awarded competitively utilizing peer panels of scientists to evaluate the scientific merit of the submitted proposals in the areas of soybean, energy, animal health and alcohol fuels research. Solicitation of applications for fiscal year 1980 grants was published in the Federal Register on November 14, 1979. Proposals are required to be submitted during January and February, 1980. Proposals will be evaluated by peer panels and it is anticipated that grants will be awarded by August 1980.

One hundred and three Special Research Grants were awarded competitively in fiscal year 1979. Given below are details on the number of proposals submitted and the number of grants for each area.

Specific Area of Inquiry	Number of Preproposals Submitted	Annual Request	Number of Grants Awarded	Total Amount of Awards
Soybeans	41	\$ 3,975,885	6	\$ 485,000
Pest Management	54	7,161,120	6	485,000
Transportation	28	2,629,064	6	485,000
Genetic Vulnerability	53	4,565,254	4	291,000
Alcohol Fuels	55	8,219,481	6	485,000
Animal Health				
Infectious Diseases	361	59,982,000	42	4,897,719
Parasites	111	18,953,922	14	1,783,177
Noninfectious Diseases	187	30,974,609	19	2,270,848

Selected examples of recent progress:

Non-Chemical Control of Mastitis. Basic mechanisms of disease resistance in the udder of the cow are being studied by scientists in the California and Ohio Colleges of Veterinary Medicine and the Wisconsin Agricultural Experiment Station to develop new, non-chemical methods of overcoming mastitis in dairy cattle, a disease of great concern to producers. This research now has demonstrated that cells within the udder are capable of producing protective substance against disease. Efforts to stimulate these cells for maximum protection are now being sought. Increasingly, antibiotics and other current forms of mastitis treatment are ineffective in many cases. This research should lead to a substantial reduction in the estimated \$1.5 billion associated with this disease each year.

Growth and Milk Production Affected By Light. Michigan Agricultural Experiment Station scientists have reported about 10 percent increased milk production by increasing the daily photoperiod to 16 hours. The rate of decline in milk production as lactation progressed also appears to be reduced. This station has also found significant growth response of dairy heifers with supplemental lighting. Increasing the light period to 16 hours per day increased weight gain 10-15 percent without requiring additional feed. Mammary glands of heifers exposed to supplemental light from 6-10 months of age were approximately 25 percent larger than those of unsupplemented heifers. These results suggest that producers can profitably increase production at minimal cost by close attention to supplemental lighting for their animals.

New Vaccine for Prevention of Bovine Respiratory Disease. Respiratory illness causes greater economic loss than any other single factor in the production of beef cattle. Control measures involving treatment and vaccines have met with varying degrees of success. Recent studies indicate that a Pasteurella bacterium is the primary cause of death or serious illness, while stress and numerous viruses are predisposing factors. Ohio and Oregon scientists now are devising new approaches in preparing and applying vaccines against the Pasteurella germ. Preliminary studies show very favorable results in preventing the disease. Other studies at Minnesota, New York, and Wisconsin are being initiated to clarify the basic requirements needed to improve immunity to diseases of the bovine lung. Successful results in these new studies will substantially reduce the \$200 million annual loss caused by bovine respiratory disease.

Making Needed Pesticides Available for Minor Crops. Researchers from all of the State agricultural experiment stations, through Inter-Regional Research project IR-4, have played a major role in helping producers of "minor" crops get Environmental Protection Agency clearance for pesticides to control insects and other pests. Commercial companies are not able to profitably go through the complicated and expensive clearance process for all chemicals used for controlling pests of minor crops. So the work of these State scientists, coordinated under this nation-wide regional research effort, has been vital to the clearance of pesticides for use on minor crops. Annually, they have achieved about 25-30 percent of all tolerances set for pesticide residues in food crops. During FY 1979, 61 percent of the pesticide industry food tolerance petitions accepted by EPA were based on these efforts. The tolerances covered uses of 10 pesticides on 12 different crops. This inter-regional project has also made significant progress in generating data for pesticide registrations on ornamental (non-food) crops. During FY 1979, national registrations were obtained allowing new uses of 8 pesticides on 455 ornamental plant species.

Peanut Resistant to Leaf Spot. A research team at North Carolina State University is developing methods to broaden the genetic base of peanuts by using germplasm from diverse lines including both exotically cultivated ones and wild-type species closely related to the cultivated peanut. Second generation crosses were tested on selections from both phases. A component part of this program is to characterize the genetic variability and potential usefulness of the derived material. At least two of the derived lines were resistant to one type of leaf spot. (Cercospora arachidieda) and two other ones to another leaf spot (Cercosporidium personatum). Also seventeen entries of species have been planted in Puerto Rico for evaluation of rust resistance. While all cultivated varieties were susceptible, five wild species lines were nearly immune.

Preservation of Plant Germplasm. Well documented is the fact that means should be sought to preserve plant germplasm to provide broad genetic base materials for present and future breeding needs. A University of Arizona research group is developing techniques for sub-freezing (cryogenic) preservation of plant germplasm. They have reported some success with cryogenic storage of carnation and potato meristems, and are applying these and modified techniques to apples, sugarcane, and alfalfa meristems. In the case of the latter materials, reproducible storage may depend either on preconditioning the tissues or on added agents (cryoprotectants) to maintain cell viability. These techniques along with different cell types provided by tissue culture are being actively sought to establish sub-freezing storage of plant germplasm.

Protection Against Erosion. Research by soil erosion specialists, plant breeders and tillage scientists has produced a combination of methods for the protection of erosive soils of Idaho, Washington, and Oregon. At present 110 million tons of soil are eroded each year from 8.5 million acres of cropland. The Universal Soil Loss Equation has been adapted for prediction of erosion on loessal soils of the Palouse region. An erosion model has been developed to take into account additional crucial climatic factors which include erosion from frozen soil, water flow in frozen soil, and effects of snowmelt on runoff. A newly developed cultivar of white winter wheat (Stephens) has provided higher tolerance to (Cercospora) foot rot than with other varieties. No-till methods of seeding peas after wheat are producing higher yields. Storage of 20 percent more water in the soil over winter is achieved in standing wheat stubble than in clean-tilled land. This additional water increases pea yields by 20 percent and increases the next wheat crop by 5 percent. Attainment of high crop yields while preventing erosion produces economic and environmental benefits at the same time.

Isolation of "Super-Strains" of Nitrogen-Fixing Bacteria. University of Minnesota researchers have isolated super strains of the nitrogen-fixing bacteria Rhizobium japonicum that provide twice as much nitrogen to the soybean plant as do native strains of bacteria normally found in the soil. However, the survival or competitiveness of these super strains in the field has been poor. The scientists are working to solve this problem by identifying soybean genotypes that nodulate only when these super strains are present and not with the native strains. Incorporating this characteristic into present soybean varieties could increase soybean yields and provide added nitrogen for the succeeding crop.

Biological Control of Soybean Insects. Louisiana State University scientists have discovered natural enemies of soybean insect pests. Both fungi and viruses have been identified that are pathogenic to the soybean looper. Also, egg parasites have helped to hold populations to sub-economic levels until late in the season. Methods for manipulating predator and parasite population to control insects in soybeans are still being studied.

Antibiotics for Soybean Diseases. Nebraska Agricultural Experiment Station scientists are investigating bacteriocins (antibiotics produced by bacteria) that can kill or retard the growth of certain bacterial diseases, especially the Pseudomonas sp attacking soybeans. They have identified bacteriocins that are specific to the diseases they want to control. What's more, the bacteriocins are not harmful to the nitrogen-fixing bacteria Rhizobium japonicum.

Ensuring Legume Inoculant Survival. Bacterial inoculants, which are used to produce nitrogen-fixing nodules on the roots of legumes, are sensitive biological systems. The bacteria must first be grown and then must be protected from drying out until contact is made with the growing root of the soybean, clover or alfalfa plants. Mississippi Agricultural Experiment Station scientists have developed a new technique for protection of the delicate bacteria in the inoculant container, keeping it alive on the seed during treatment and for survival in the soil. The new protectant is a vegetable oil which covers carbohydrate material of the bacterial substrate to exclude air and prevent further drying out. Soybeans can produce 5 to 7 bushels more per acre when inoculated by this technique. The method is especially effective where there is hazard from fertilizer salts or drying conditions in the soil.

Improving Dietary Vitamin B-6 Status. The 1977 USDA Food Consumption Survey identified vitamin B-6 as one of the nutrients for which dietary intakes fell short of recommended levels by a substantial margin. Human metabolic studies in progress at Oregon State University are focused on this nutrient. Under examination is the bioavailability of vitamin B-6 from foods (beef, breads, soy) as well as dietary factors (fiber) influencing its utilization. Results of this research will provide the scientific foundation necessary for making sound practical recommendations for improving dietary vitamin B-6 status.

COMPETITIVE RESEARCH GRANTS

The program of Competitive Research Grants was initiated in 1978 to fund basic research in selected high priority areas related to food production and human nutrition. The competitive grants are to complement the on-going research efforts of the USDA and the traditional agricultural research community by obtaining the participation of research scientists throughout the entire U.S. scientific community who have outstanding expertise in these and related areas. The important and unique complimentary nature of the Competitive Research Grants for basic research to the continuing research programs of the USDA and cooperating State institutions is in furtherance of the intent of the Congress as stated in the Food and Agriculture Act of 1977.

The following is a description of current activities and selected examples of accomplishments from these appropriated funds:

Current activities: The four target areas relating to crop productivity are photosynthesis, biological nitrogen fixation, genetic mechanisms for crop improvement, and plant protection from biological stresses (e.g., insects, pathogens, viruses, and nematodes). Those in human nutrition relate to establishing human nutrient requirements.

The targeted areas were identified as possessing great opportunities for scientific discoveries and for contributing to applied research vitally needed on important food problems. These areas had been highlighted by a number of national and international studies including the National Academy of Sciences "World Food and Nutrition Study, the USDA/SAES Kansas City Conference on "Research to Meet U.S. and World Food Needs," the MSU/Kettering Conference on "Crop Productivity-Research Imperatives," and the Congressional Office of Technology Assessment on "Organizing and Financing Basic Research to Increase Food Production."

Solicitation of applications for fiscal year 1980 grants was published in the Federal Register on November 29, 1979. Proposals are required to be submitted during January and February of 1980. Proposals will be evaluated by peer panels and it is anticipated that grants will be awarded from July to September of 1980.

The Competitive Research Grants Office received 861 research proposals in FY 1979 requesting about \$134,000,000 for support of research in the targeted areas. From these proposals, 193 grants were made in the areas, for the amounts, and to the types of research organizations noted below. Less than one-third of the research proposals, which were evaluated by ad hoc and peer panel reviewers and competitive research grants office scientists to represent good to excellent science related to the mission of this program, was funded. Clearly, the broad scientific community mandated by Congress was reached and research important to the mission of the program has been supported.

	<u>Proposals</u>	<u>Numbers</u>	<u>Grants</u>
			<u>Millions</u>
Plant Biology			
Biological Stress	270	54	\$ 3,126,000
Genetic Mechanisms	142	40	2,450,000
Nitrogen Fixation	106	27	2,030,000
Photosynthesis	118	29	2,094,000
Subtotal	<u>636</u>	<u>150</u>	<u>9,700,000</u>
Human Nutrition			
Nutrient Requirements	141	33	4,019,976
Behavioral Factors	84	10	830,000
Subtotal	<u>225</u>	<u>43</u>	<u>4,849,976</u>
TOTAL	<u>861</u>	<u>193</u>	<u>14,549,976</u>

These proposals were submitted by scientists located at 299 different research organizations in 51 States, the District of Columbia, and Puerto Rico as summarized below. The 861 proposals were received from five basic categories or organizations in the numbers indicated. Grants were made to 81 different grantee organizations in 39 States and the District of Columbia. The distribution among the major categories of grantee organizations is noted.

	<u>Proposals Received</u>	<u>Grants Awarded</u>	<u>Dollars Awarded</u>
Land-Grant Universities	560	134	\$ 9,866,076
SAES		(89)	(3,148,000)
Non-SAES		(45)	(6,718,076)
Private Universities	76	14	1,599,900
Other Public Universities	113	25	1,643,000
Federal Laboratories	63	12	769,000
AR/SEA/USDA	(57)	(11)	(619,000)
Other	(6)	(1)	(150,000)
Private Non-Profit	35	8	672,000
State or Local Agencies	<u>14</u>	<u>0</u>	<u>0</u>
TOTAL	<u>861</u>	<u>193</u>	<u>14,549,976</u>

Selected examples of recent progress:

Selenium: Its Metabolism, Interrelationships with Other Nutrients and Human Dietary Implications. The chemical element selenium is both a bane and a blessing. At the high concentrations accumulated in certain plants on the range land of the Dakotas it is known as a toxic substance to cattle. At much lower concentrations, selenium is recognized as an essential micronutrient required for the healthy development of many species including humans. At South Dakota State University, an effort is being made to clarify many aspects of the selenium problem. Various food substances are being analyzed for their selenium content. Differences in the ability of humans and animals to react to selenium are being characterized. Finally a substance has been identified in linseed oil meal that protects against the toxic effects of high levels of selenium. This work will provide an important frame of reference to view the problem of selenium in our environment.

Integrative Management of Agriculturally Important Molluscan Pest Species.

After a summer with lots of rain, it is easy for both the amateur gardener and the professional vegetable producer to appreciate the damage done by terrestrial slugs or garden snails. The slugs are attracted to their food by volatile chemicals produced by plants. Now there is an effort underway to isolate and identify the chemical attractant which lures the slug more effectively than the finest French perfume. Once the attractant substance is identified, it could be produced in sufficient quantity for use as bait in traps. This could allow control of the slug near vegetable crops without using toxic chemicals.

Interaction Between Erwinia Amylovora and Selected Bacteriocinogenic Bacteria. A new method is being developed to control fire blight, a bacterial disease capable of causing great damage to apple and pear crops. Some bacteria will produce an antibiotic protein which will inhibit the growth of specific target bacteria. A bacterium which does not cause fire blight is being used as a source of antibiotic protein to inhibit the growth of the disease producing bacteria. Since the antibiotic protein is toxic only to one type of bacterium and since it is readily destroyed by other kinds of organisms, this research offers a very specific disease control agent which will not persist in the environment or create problems of long enduring toxicity to other creatures. This research is being done at Cornell University in Ithaca, New York.

Primary Energy Storage Reactions of Photosynthesis. A competitive research grant awarded to the University of Washington has allowed for the purchase and adaptation of equipment to study the conversion of solar energy into stable biological products. Among the events that occur shortly after light energy penetrates a photosynthetic cell is the movement of certain chemical substances which are reorganized to store the energy in a biologically useful form. An extraordinary acoustical method to record the movement of substances within the photosynthetic structure has been developed. By understanding these molecular transformations which occur in the slightest intervals of time after light strikes the photosynthetic apparatus, one can understand and perhaps better manipulate and apply the special ability of green plants to efficiently convert solar energy into stable chemical substances.

Significance and Role of Hydrogenase in Nitrogen Fixation by Legumes. Much of the soybean seed planted in the U.S. is first coated with nitrogen fixing bacteria to insure an interaction between the plant and the bacteria which converts nitrogen from the air into ammonia to nourish the plant. Oregon State University found that some of these bacteria also consume hydrogen and these strains have a greater efficiency in nitrogen fixation. A simple method has been developed for selecting hydrogen consuming strains of bacteria and an attempt will be made to transfer this trait to bacteria which associate with alfalfa and clover. This approach has enormous potential value in enhancing the natural fertilization and thus increasing the yield of these important crops.

Leaf Isozymes as Genetic Markers in Citrus Breeding. Breeders of citrus crops have had great difficulty in making hybrid crosses between different kinds of oranges or different kinds of lemons. When a cross is attempted between two varieties, both of which have desirable properties that should appear in the progeny, the seedlings often are exact duplicates of one parent. Since citrus trees are slow in reaching maturity, it has taken five to ten years before one could be sure a hybrid had been created. Scientists at the University of Kansas and at the University of California-Riverside are developing a technique to recognize real hybrids using a sensitive method of enzyme analysis. A small sample of tissue from the seedling can yield an enzyme pattern which is a distinctive fingerprint of the genetic endowment of that seedling. Thus the real hybrids can be identified early and cultivated to maturity.

Selection in Cell Cultures of Alfalfa: Regeneration of Nutritionally Improved Plants. The genetic engineering of new crops would be greatly accelerated by the application of microbiological selection of new traits and of cloning or regeneration of whole plants from selected single cells. This project being conducted at the University of Wisconsin is making headway by using this approach in the development of new strains of alfalfa with improved nutritional value for the animals which must eat it. Billions of individual alfalfa cells in tissue cultures can be grown and methods to regularly regenerate intact plants from individual cells taken from these cultures have been developed. Screening techniques to isolate rare mutant cells with high content of desirable nutrients from the vast populations of cells in cultures are now being applied. The selected cells can then be converted to intact plants and rapidly tested for their potential as improved crops.

RURAL DEVELOPMENT RESEARCH

Funds under the Rural Development Act of 1972 are allocated to the fifty States and Puerto Rico to...."encourage and foster a balanced national development that provides opportunities for increased numbers of Americans to work and enjoy a high quality of life....". This purpose is achieved by providing knowledge essential for successful rural development programs.

The following is a description of current activities and selected examples of accomplishments from these appropriated funds:

Current activities: Annual Plans of Work are developed jointly by Agricultural Experiment Stations and Extension to meet specific local or State needs, and are approved by a broadly based State Rural Development Advisory Council and the Secretary of Agriculture. The program is administered by the Land-Grant Institutions of 1862 and involves 1890 Land-Grant Institutions and other public and private colleges and universities. Increasing the capacity of colleges and universities to perform the public service roles of research, transfer and application of knowledge in rural development is an important objective of Title V.

In each of the past three years, the States and Puerto Rico have conducted some 900 projects under Title V. About half were research or joint research and extension projects. The research focused on key local and national issues--jobs, employment, income; improvement of essential community services and facilities, enhancing the capacity of local governments and local planning and development agencies; improving the supply and quality of low and moderate income housing; protection of the environment and abatement of pollution, and improving the data available for making local decisions. About one-third of the projects dealt with jobs and income, over half with community services and facilities, and 12 percent with environment and pollution abatement.

Selected examples of recent progress:

Improved Water and Sewage Disposal Services. The provision and management of water and waste disposal services in Indiana County, Pennsylvania, emerged as major priorities in the mid 1970's. The Indiana County Municipal Services Authority was created to deal with these problems.

University scientists in cooperation with the Authority surveyed all potential customers regarding their views of problems, the amount of water used, and their willingness to pay for improved services. This documentation was crucial in obtaining \$3.8 million from the Farmers Home Administration to renovate the water system in 10 communities. The renovation is now in progress (1979-1980). Additional work was done to better determine an equitable rate schedule and to encourage conservation of water. The study approach used to help determine rate schedules can and is being used in other communities. The local Title V Extension agent helped to define and interpret each study to public officials and citizens.

In 1978 a similar survey was carried out with the Burrell Township, Sewer Authority, Indiana County, Pennsylvania, to determine the level of support for a sewage treatment system. The results of this study are the basis of a proposed sewer system for which a pre-application for FY 1980 funding has been submitted to Farmers Home Administration.

Seminars Help Small Businesses. Business establishments in small towns provide important services to all rural people including farm firms and farm families. For decades these small businesses have been threatened by dramatic changes in agriculture and rural areas and by increasing competition from larger towns and cities. A pilot project in the Ottumwa area in Iowa demonstrated the feasibility of combined applied research and extension programs for assisting small businesses. Ways of assessing markets, determining the needs for services and improving small business operations were tested and built into Business Management Seminars. Seminars were conducted in ten South Central Iowa communities with an attendance of 30-40 people in each seminar or a total of some 350 people.

Two types of outcomes were documented. One was improvement in individual business firms, improvements in quality of present services, provisions of new services, consumer relations, inventory control, cash flow, and employer-employee relations. The second was cooperation among small town businesses to gain a larger share of the local market and improve their competitive position.

ANIMAL HEALTH AND DISEASE RESEARCH

The Animal Health and Disease Research (Section 1433, Public Law 95-113) program is directed to improving the health and productivity of animals and the welfare of producers and consumers of animal products, protecting human health through control of animal diseases transmissible to humans, minimizing livestock and poultry losses due to transportation and handling, and facilitating the effective treatment and prevention of animal diseases.

The following is a description of current activities and selected examples of accomplishments from these appropriated funds:

Current activities: \$5 million was appropriated for the first time in Fiscal Year 1979 for Sections 1433 and 1434 of Public Law 95-113. In consultation with the Animal Health Science Research Advisory Board authorized under this Law, it was determined that viable animal health research programs could be implemented most effectively under the requirements of Section 1433. Section 1434, therefore, was not utilized in disbursement of FY 1979 funds.

Institutions qualifying for FY 1979 funds under Section 1433 requirements included 25 Colleges of Veterinary Medicine, 51 State Agricultural Experiment Stations, 1 College of Medicine, and a Medical Research Center. Distribution of funds was made by formula requirements of Section 1433 based on the relative importance of livestock and poultry production in the States (48%) and the capacity of eligible institutions to conduct animal health research (48%). Four percent was retained by the Department for administration, program assistance to the eligible institutions, and program coordination.

Recommendations of the Animal Health Science Research Advisory Board have been followed in program implementation (i.e., scope and priorities of eligible research, determination of research capacity of eligible institutions and other questions on program administration). In accordance with advice of the Board, emphasis in this new research has centered on the solution of high priority diseases or other animal health hazards occurring in the production of livestock, poultry, and aquaculture species.

State Comprehensive Plans for animal health research, approved by SEA-CR, were developed by the eligible institutions within each State. These Plans include the major areas of animal health research to be conducted by the institutions and mechanisms to assure effective coordination of research among the institutions. Provisions of Section 1433 project implementation permit selection of studies within each State based on highest priority needs and capabilities of the institutions to conduct the needed research.

In the first year of implementation 330 projects were initiated. These are aimed at solution of infectious and noninfectious diseases or parasite problems of food animals and horses. Most projects are designed as three to five year studies and are continuing under FY 1980 appropriations for Section 1433. Strong emphasis is being placed on solution of respiratory, enteric, and reproductive diseases. Other major problems such as mastitis, pseudorabies, brucellosis, sheep predators, and pinkeye are being investigated. Causes of disease are under study; new methods for disease diagnosis and carrier detection are being sought; new or improved treatments are being tested; methods of increasing resistance to disease are being developed; and biological methods to replace chemical control of livestock insects and internal parasites are being evaluated.

Selected examples of recent progress:

An Improved Method for Diagnosing Livestock Diseases. Numerous viruses cause serious disease losses in livestock production. Identification of a virus suspected of causing a disease outbreak requires tedious and time-consuming laboratory procedures. Accurate identification is essential in implementing effective measures for disease control. Several states have initiated studies involving a new principle for virus disease diagnosis called the ELISA assay. Preliminary results of their work show that this test will prove of special value for the rapid and comparatively easy method for diagnosing many important virus diseases. An additional benefit is the fact that radioactive materials are not required as in the case with another commonly used viral diagnostic test. It is expected that the new test will provide the tool needed by laboratories for low cost, rapid and highly accurate diagnosis of livestock disease outbreaks.

Control of Bluetongue Disease in Exported Breeding Cattle. Bluetongue, discovered in this country in recent years, has become a widespread and serious disease of sheep. Cattle now occasionally suffer from the disease, but more commonly expensive breeding animals destined for foreign markets are found to be infected prior to shipment. Many foreign countries prohibit entry of such animals resulting in losses to our producers and our balance of payments. A rapid test (ELISA) is being developed by Colorado and California scientists to permit easy detection of bluetongue carriers. Early detection and elimination of these carriers from herds before infection becomes widespread will be possible. A vaccine also is being developed for use in cattle to prevent bluetongue infection. Measures resulting from this research will reduce or eliminate the prohibition which foreign countries now are placing on cattle exported from this country.

SCIENCE AND EDUCATION ADMINISTRATION
EXTENSION

Purpose Statement

Cooperative agricultural extension work was established by the Smith-Lever Act of May 8, 1914, as amended. The legislation authorizes the Department of Agriculture to give, through the Land-Grant Colleges, instruction and practical demonstrations in agriculture and home economics and related subjects and to encourage the application of such information by demonstrations, publications, and other means to persons not attending or resident in the colleges. This work is further emphasized in Title XIV (National Agricultural Research, Extension, and Teaching Policy) of the Food and Agriculture Act of 1977, more generally known as the Farm Bill.

The basic job of Cooperative Extension is to help people identify and solve their farm, home, and community problems through use of research findings of the Department of Agriculture and the State Land-Grant Colleges and programs administered by the Department of Agriculture. This work is carried out through State and county extension offices in each State, Puerto Rico, Guam, the Virgin Islands and the District of Columbia.

State and county extension work is financed from Federal, State, County, and local sources. These funds are used within the States for the employment of county agents, home economics agents, 4-H Club agents, State and area specialists, and others who conduct the joint educational programs adapted to local problems and conditions. There are approximately 16,000 State and County extension personnel employed throughout the States.

The Extension unit of the Science and Education Administration, USDA, as a partner in the cooperative effort, employs a national staff to coordinate the program by:

- Serving as liaison between the Department of Agriculture and the State extension services, providing program leadership and assistance to the states in the conduct of Extension work.
- Administering Federal laws authorizing Extension work and coordinating the work among the States.
- Providing leadership for the educational phases of all programs under the jurisdiction of the Department.

As of September 30, 1979 the Federal office had 146 permanent full-time employees and 15 other than permanent employees.

SCIENCE AND EDUCATION ADMINISTRATION

The new estimates include proposed changes in the language of this item as follows (new language underscored; deleted matter enclosed in brackets):

Extension Activities

Payments to States, Puerto Rico, Guam, and the Virgin Islands: For payments for cooperative agricultural extension work under the Smith-Lever Act, as amended by the Act of June 26, 1953, the Act of August 11, 1955, the Act of October 5, 1962 (7 U.S.C. 341-349), section 506 of the Act of June 23, 1972, and the Act of September 29, 1977 (7 U.S.C. 341-349), to be distributed under section 3(b) and 3(c) of the Act, for retirement and employees' compensation costs for extension agents, and for costs of penalty mail for cooperative extension agents and State extension directors, /\$189,331,000/ \$200,847,000; payments for the nutrition and family education program for low-income areas

- 1 under section 3(d) of the Act, /\$51,810,000; payments for the urban gardening programs under section 3(d) of the Act, \$3,000,000/ \$55,962,000; payments
- 2 for the pest management program under section 3(d) of the Act, /\$6,435,000; payments for the farm safety program under section 3(d) of the Act, \$1,020,000/ \$7,435,000; payments for the pesticide impact assessment program under section 3(d) of the Act, \$1,835,000; payments for the energy demonstration program under section 3(d) of the Act, \$300,000; payments for non-point source pollution program under section 3(d) of the Act, \$1,300,000;
- 3 payments for extension work under section 209(c) of Public Law 93-471, \$910,000; /\$2,500,000 for Rural Development Education as authorized under the Rural Development Act of 1972 (7 U.S.C. 2661-2668);/ payments for extension work by the colleges receiving the benefits of the second Morrill Act (7 U.S.C. 321-326, 328) and Tuskegee Institute under Section 1444 of the National Agricultural Research, Extension and Teaching Policy Act of 1977 (Public Law 95-113), /\$10,453,000/ \$11,089,000; and for carrying out the provisions of section 22 of the Act of June 29, 1935, as amended (7 U.S.C. 329), \$11,500,000; in all /\$278,994,000, of which not less than \$78,600,000 is for Home Economics:/ \$291,178,000: Provided, That funds hereby appropriated pursuant to section 3(c) of the Act of June 26, 1953, and section 506 of the Act of June 23, 1972, as amended, shall not be paid to any State, Puerto Rico, Guam, or the Virgin Islands prior to availability of an equal sum from non-Federal sources for expenditure during the current fiscal year.

Federal administration and coordination: For administration of the Smith-Lever Act, as amended by the Act of June 26, 1953, the Act of August 11, 1955, the Act of October 5, 1962, section 506 of the Act of June 23, 1972, section 209(d) of Public Law 93-471, and the Act of September 29, 1977 (7 U.S.C. 341-349), and to coordinate and provide program leadership for the extension work of the Department and the several States and insular

- 6 possessions, /\$6,543,000, of which not less than \$2,100,000 is for Home Economics/ \$6,956,000.

The estimates include proposed changes in the language of this item as follows:

The first change is for the purpose of deleting language which provides funds for the urban gardening program under section 3(d) of the Smith-Lever Act. No funding is proposed for this program in fiscal year 1981.

The second change is for the purpose of deleting language which provides funds for the farm safety program under section 3(d) of the Smith-Lever Act. No funding is proposed for this program in fiscal year 1981.

The third change provides language which authorizes funding for an earmarked program in the area of nonpoint source pollution under section 3(d) of the Smith-Lever Act.

The fourth change is for the purpose of deleting language which provides funds for rural development programs authorized under Title V of the Rural Development Act of 1972. No funding is proposed for extension rural development programs under Title V in fiscal year 1981.

The fifth and sixth changes are for the purpose of deleting the limitation established in the FY 1980 Appropriation Act on the amount of support for Extension's home economics program. This limitation conflicts with the primary intent of the Smith-Lever Act to give maximum latitude to the State Cooperative Extension Services to conduct programs according to the needs of their State.

EXTENSION ACTIVITIES

Appropriation Act, 1980.....	\$285,537,000
Budget Estimate, 1981.....	298,134,000
Increase in Appropriation.....	<u>+12,597,000</u>

SUMMARY OF INCREASES AND DECREASES

<u>Item of Change</u>	<u>1980 Estimated</u>	<u>Program Changes</u>	<u>1981 Estimated</u>
Smith-Lever:			
For Sections 3(b) & (c).....	\$189,331,000	+\$11,516,000	\$200,847,000
For Pest Management.....	6,435,000	+1,000,000	7,435,000
For Farm Safety.....	1,020,000	-1,020,000	—
For Urban Gardening.....	3,000,000	-3,000,000	—
For Nonpoint Source Pollution....	—	+1,300,000	1,300,000
For Food & Nutrition Education...	51,810,000	+4,152,000	55,962,000
For Pesticide Impact Assessment..	1,735,000	+100,000	1,835,000
Title V Rural Development.....	2,500,000	-2,500,000	—
1890 Colleges & Tuskegee Institute.	10,453,000	+636,000	11,089,000
Federal Admin. & Coordination.....	6,543,000	+413,000	6,956,000
All Other.....	12,710,000	—	12,710,000
TOTAL AVAILABLE.....	<u>\$285,537,000</u>	<u>+\$12,597,000</u>	<u>\$298,134,000</u>

a/ Includes a total increase of \$15,404,000 toward increased operating costs in order to sustain performance levels for continuing programs. Includes a total increase of \$413,000 for the portion of pay increases effective in FY 1980 which were absorbed in FY 1980 but which are necessary to carry out the programs proposed for FY 1981.

PROJECT STATEMENT

Project	: 1979	: 1980 :(estimated)	: Increase or Decrease	: 1981 :(estimated)
1. Payments to States:	:	:	:	:
a. Smith-Lever Act:	:	:	:	:
(1) Sections 3(b) & 3(c):	:	:	:	:
(a) Program.....	141,032,726	147,262,680	+ 9,056,360	156,319,040
(b) Set-aside for Federal Administration (4%).....	3,461,320	3,841,320	+460,640	4,301,960
Total.....	144,494,046	151,104,000	+ 9,517,000	160,621,000
(c) Retirement and employees' compensation costs.....	21,610,000	23,294,000	+ 1,432,000	24,726,000
(d) Penalty mail.....	13,700,000	14,933,000	+567,000	15,500,000
Subtotal, Sections 3(b) & 3(c).....	179,804,046	189,331,000	+11,516,000	200,847,000
(2) Section 3(d):	:	:	:	:
(a) Food and Nutrition(EFNEP)....	51,810,000	51,810,000	+ 4,152,000	55,962,000
(b) Rural development.....	997,592	--	--	--
(c) Pest Management.....	5,435,000	6,435,000	+1,000,000	7,435,000
(d) Farm Safety.....	1,020,000	1,020,000	-1,020,000	--
(e) Pesticide Impact Assessment..	1,735,000	1,735,000	+100,000	1,835,000
(f) Urban Gardening.....	3,000,000	3,000,000	-3,000,000	--
(g) Energy.....	--	300,000	--	300,000
(h) Non-Point Source Pollution..	--	--	+1,300,000	1,300,000
Subtotal, Section 3(d).....	63,997,592	64,300,000	+2,532,000	66,832,000
Total, payments under the Smith-Lever Act.....	243,801,638	253,631,000	+14,048,000(1)	267,679,000
b. Payments to the District of Columbia:	:	:	:	:
(1) Program.....	825,600	873,600	--	873,600
(2) Set-aside for Federal Administration (4%).....	36,400	36,400	--	36,400
Total, payments to the District of Columbia.....	862,000	910,000	--	910,000
c. Payments under Title V, Rural Development Act of 1972:	:	:	:	:
(1) Program.....	2,400,000	2,400,000	-2,400,000	--
(2) Set-aside for Federal Administration (4%).....	100,000	100,000	-100,000	--
Total, Title V, Rural Development.....	2,500,000	2,500,000	-2,500,000(2)	--
d. Payments to 1890 Colleges and Tuskegee Institute	:	:	:	:
(1) Program.....	9,710,400	10,034,880	+610,560	10,645,440
(2) Set-aside for Federal Administration (4%).....	404,600	418,120	+25,440	443,560
Total, payments to 1890 Colleges and Tuskegee Institute.....	10,115,000	10,453,000	+636,000(3)	11,089,000
2. Aid to Land-Grant Colleges (Bankhead-Jones Act).....	11,500,000	11,500,000	--	11,500,000
3. Federal Administration and Coordination (Direct Appropriation).....	5,666,147	6,543,000	+413,000 (4)	6,956,000
Unobligated balance.....	954,215	--	--	--
Total available or estimate.....	275,399,000	285,537,000	+12,597,000	293,134,000

Explanation of Program

Appropriations for the Extension unit of the Science and Education Administration enable the U.S. Department of Agriculture to perform its partnership role with its State and County counterparts to carry out cooperative agricultural extension work for the benefit of our Nation's farmers and ranchers, agricultural industries, rural and urban communities, families and youth, and the ultimate consumers.

Cooperative agricultural extension work is authorized under the Smith-Lever Act of 1914, as amended; the Rural Development Act of 1972, as amended; and the District of Columbia Public Postsecondary Education Reorganization Act. The National Agricultural Research, Extension and Teaching Policy Act of 1977 also authorizes the Federal Government, States and Counties to implement cooperative agriculture extension programs commensurate with needs stemming from changes in U.S. agricultural practices and the world food and agricultural situation.

Through these basic legislative authorities, a variety of programs broadly identified under the following major thrusts are conducted by the Cooperative Extension Services in each State, Puerto Rico, Guam, the Virgin Islands, and the District of Columbia.

- Agriculture -- This program serves as the primary delivery system of agricultural research in all counties and agricultural communities throughout the States. Approximately 6,466 staff-years or 38% of the total Extension professional staff-time is in support of this program which emphasizes the attainment of highly efficient systems of production, processing and marketing of food and fiber by commercial farmers, small and limited resource farmers, and others engaged in agriculture.
- Natural Resources -- This program accounts for about 562 staff years or 3.3% of Extension professional staff time. Among the current areas of emphasis are forest management, rangeland management, fish and wildlife management, outdoor recreation, and environmental management and public policy.
- Community Resource Development -- This program helps local officials and community leaders to more clearly identify their specific needs and resources, better understand possible solutions, formulate action plans, and carry out their decisions. Through Extension assistance, local leaders and officials have been better able to utilize current research and technology, broaden citizen participation in the decision making process, and quickly determine what Federal assistance is available to them. Approximately 1,361 staff-years or 8% of the total Extension professional staff-time is in support of this program which includes assistance in manpower development, community services and facilities and other community development programs.
- Home Economics -- This program is directed to families and individuals at all levels of society to help them identify their needs, make improved decisions, and use and conserve their resources to achieve a desirable level of living. Approximately 3,879 staff-years or 22.8% of Extension professional staff-time is in support of this program which includes assistance in food and nutrition, clothing and textiles, family resource management, and health safety.

-- 4-H Youth -- This program is designed to help youth from all racial, ethnic, and socioeconomic backgrounds develop life skills through participation in 4-H Clubs, 4-H special interest groups, instructional 4-H T.V. series, and special 4-H nutritional education programs. Approximately 4,747 staff-years or 27.9% of the total Extension professional staff-time is in support of this program.

JUSTIFICATION OF INCREASES AND DECREASES

(1) A net increase of \$14,048,000 for payments to States for cooperative agricultural extension work under the Smith-Lever Act consisting of:

(a) An increase of \$11,516,000 in funds authorized under sections 3(b) and (c) of the Smith-Lever Act for increased operating costs (\$189,331,000 available in 1980).

Need for Change. These funds are requested to enable the 1862 land-grant institutions to maintain the current level of basic programs. During the last few years, these institutions have had to limit the range and magnitude of extension programming due to the declining value of the dollar. This was compounded with increased pressures from all sectors of our society for extension to assist in addressing national high - priority concerns on energy, environment, weather and climate, human nutrition, and others in addition to traditional extension programming. While the cost of conducting these programs continued to rise, the amount of Federal, State and local support was not sufficient in keeping up with the multiplier effect of these costs, i.e., rising salaries and wages, increased cost of services, supplies and materials, and equipment prices.

One serious impact has been that extension salaries have generally lagged behind private and other public agency salaries in the States. This has contributed to an increased turnover rate in State extension employment with a corresponding detrimental impact on programs. As is usually the case, the more highly qualified employees are the ones who have accepted other employment.

These funds would enable the States to meet anticipated increases in these costs in FY 1981. In line with these additional funds, it is also recommended that the States strengthen programs in the following high-priority areas: assistance to small farm operators and their families; assistance to urban residents in the area of home gardening, human nutrition, and consumer education; and natural resource conservation, protection, and utilization programs.

Small Farms--The feasibility of intensive work with small farmers has been clearly demonstrated, and a number of States have already moved beyond the pilot stage and have implemented programs with formula funds combined with State and local matching. All States would be encouraged to follow this lead. Much of the work needed to adapt educational materials for the small farm clientele has been accomplished. States having done this will be encouraged to increase their efforts in sharing these materials with other states.

Urban Extension--The competency of extension work in urban areas has grown steadily in recent years. Included in this increasing competency are programs in urban gardening, 4-H, consumer education, and human nutrition. There still is a need to expand these programs in cities with populations of over 100,000.

Natural Resources-- Historically, information needs for owners and users of forests and rangeland have been financed at a minimum level. Currently, only around 1% of the total Federal extension budget is expended for this program designed to increase productivity on our nation's forest and rangelands, improve utilization efficiency, and meet growing demands for non-market outputs such as wildlife habitat, aesthetics and recreation.

Nature of Change. These funds would provide for approximately a 5.5% increase in payments to States and would be allocated to the States in accordance with the Smith-Lever, section 3(b) and (c) formula provisions. States may use these additional funds to meet increased salaries and other operating costs or to augment high-priority programs.

(b) A net increase of \$2,532,000 in funds authorized under section 3(d) of the Smith-Lever Act consisting of:

1. An increase of \$4,152,000 for the Expanded Food and Nutrition Education Program (EFNEP) (\$51,810,000 available in 1980) consisting of:

- a. An increase of \$3,152,000 for increased costs of operations.

Need for Change. Since 1975, the funding level for this program has increased by only 2.5 percent. During this same period, the costs of operating the program have continued to rise in relation to increases in salaries, benefits, and other cost increases in the economy. Normally, these additional operating costs were absorbed by the States from funds allocated to them for the EFNEP program. As a result, the number of low-income participants as well as the number of sites that could be reached by the program has declined through the years. For example, between fiscal years 1976 and 1978, the number of program sites went down from 1,445 to 1,270 or a 12 percent drop in 2 years. The number of families served in the program also went down from 340,000 to 314,000 and the full-time equivalent that the nutrition aides devote to the program went down from 4,834 to 3,718 during these 2 years.

Nature of Change. This increase will help the States to operate the program at basically the same level as in FY 1980. These funds would be provided to the States on the basis of present distribution of EFNEP funds as appropriated under section 3(d) of the Smith-Lever Act.

b. An increase of \$1,000,000 for EFNEP nutrition studies.

Need for Change. Participants in the food stamp program come from the lower income bracket of our society. Thus, good nutrition and other knowledge needed to improve their well being is secondary to their basic survival. The Expanded Food and Nutrition Education Program (EFNEP) specifically directed to the low-income groups, has demonstrated its ability to serve this hard-to-reach clientele group with food and nutrition education including wise food-buying habits through the use of nutrition aides. During 1980, 16 pilot projects are being initiated as a joint-effort between SEA and FNS-USDA to develop concepts and methodologies within the EFNEP program in order to assist families participating in the food stamp program. This increase is proposed in order to amplify and enhance the most cost-efficient projects being piloted this year. With these additional funds, new methodologies for EFNEP and diffusion of model approaches to a variety of low-income community situations will be validated and provided to all State Extension Services for incorporation into their EFNEP programs. In addition, single concept printed materials would also be developed, specifically designed for persons with low reading and comprehension levels, on how to buy and prepare for more nutritious and economical meals and on the relationship between food and good health.

Nature of Change. This increase will be supplemented with \$1.0 million from FNS for a total Departmental support of \$2.0 million in FY 1981. These funds would be used to facilitate incorporation into the EFNEP program, concepts and methodologies encouraging the purchase of nutritious foods among families participating in the food stamp program.

2. An increase of \$1,000,000 to expand current programs in Integrated Pest Management (IPM) (\$6,435,000 available in 1980).

Need for Change. The State Cooperative Extension Services have established ongoing IPM programs in a limited number of counties in all States, Puerto Rico, and the Virgin Islands. The programs involved management of complexes of insects, diseases, weeds, nematodes, and other pests as appropriate for the local agriculture on 43 major commodities, as well as development of Urban IPM programs for gardeners. The current need is to expand the capability of the State Extension Services to provide IPM programs for additional communities and counties, which can be done as trained manpower and financial resources become available. This educational program can reduce use of pesticides, stabilize agricultural production, increase net profits to farmers, improve the urban environment, and reduce environmental hazards to soil, water, and man from pesticides. With increased information demonstrations, and technical assistance, producers and homeowners will be able to secure IPM advisory services from county Extension offices, private consultants and IPM farmer-operated cooperatives. Continuation and expansion of ongoing Extension IPM programs will assure that all appropriate research can be incorporated into Extension programs for farmers, ranchers, and homeowners. Intensified educational programs will be especially needed for small and limited resource farmers and gardeners; therefore, specialized educational materials and demonstrations will be developed for these groups.

Nature of Change. Funds will be allocated to the States, utilizing the existing formula agreed upon between the Department and Extension Committee on Organization and Policy (ECOP), to expand ongoing IPM educational programs after approval of State Plans of Work that show increased interdisciplinary coverage of those pests that limit production of agricultural commodities. State plans will emphasize reaching more producers with IPM programs offered by grower-operated organizations and private consultants that provide for monitoring of pest populations, assistance in predicting damage from pests, and decisions on alternative choices of appropriate pest control methods. New educational materials and demonstrations for small and limited farmers will also be developed. Educational packages will be developed to promote Urban IPM Programs, especially to strengthen the pest control aspect of existing horticultural programs.

3. A decrease of \$4,020,000 to eliminate earmarked funding for farm safety (\$1,020,000) and urban gardening (\$3,000,000).

Need for Change. This proposal eliminates specifically earmarked funding for these programs under section 3(d) of the Smith-Lever Act. The main purpose of providing earmarked funding is to raise the visibility of a specific program or problem that needs to be addressed nationally or collectively by the State Cooperative Extension Services. The Department feels that this objective has been accomplished in these two programs. For instance, when earmarked funds for the farm safety program were first provided to all states in 1975, only eight states were conducting this type of assistance. We now believe that the essentiality of the program has been demonstrated to the point where about one half of the states will continue to provide this type of assistance to their clientele even without this earmarked funding.

The urban gardening program currently being carried out in 16 major U.S. cities as pilot programs was initiated in 1977 to demonstrate the benefits of home gardening in our urban areas. This program was valuable in teaching participants in our major cities the benefits of home gardening. However, it has not been cost-efficient in terms of vegetables produced as compared with funds expended in the program. Also, like the farm safety program, the urban gardening program is carried out as part of the ongoing state extension horticulture programs. Gardening information is readily available to all farm, rural, and urban residents through the county extension offices upon request. Therefore, similar types of extension assistance are being carried out by the State Cooperative Extension Services from funds available to them under the Smith-Lever formula and from State and county extension appropriations.

Nature of Change. This change would eliminate specifically earmarked funds for these programs under section 3(d) of the Smith-Lever Act. No adverse effect is expected from this proposal since the states have the authority to use a major portion of the funds available to them to address any programs they wish including these.

4. An increase of \$1,300,000 for nonpoint source pollution.

Need for Change. National water quality strategy places high priority on improved control of nonpoint source pollution, especially that from agricultural practices.

Present EPA and USDA administrative policy calls for voluntary, non-regulatory programs for improved management of agricultural nonpoint pollution sources. Effective voluntary programs require extension support. This support is increasingly requested by other local, State, and Federal agencies charged with agricultural nonpoint pollution management responsibilities.

Effective and efficient management of toxic substances, wastes, and excess nutrients from agricultural and municipal sources, protection of our lands from excess erosion, and surface waters from polluting run-off and sedimentation are critical problems. Increasing amounts of "best management practices" are needed on crops, range, and forest lands to minimize the resulting nonpoint source pollution. These improved practices will embrace the adaptation and utilization of the most effective types of soil tillage, improved management of plant nutrients, herbicides, pesticides, ground tile drainage and sediment basins, irrigation water, together with more efficient utilization of crop and harvesting wastes, animal manure and sewage sludges, and effluents. With increasing nonpoint pollution control in agricultural areas extension needs to expand its educational programs for managing soil, water, and range resources, and improving methods for recycling wastes and reducing pollution and degradation of water, air, and soil resources utilized for farming, forestry, grazing, and non-agricultural purposes.

In October 1979, a memorandum of understanding was finally signed by officials of the U.S. EPA and SEA-USDA, on related, expanded cooperative extension educational programs for improved management of agricultural nonpoint sources of pollution.

U.S. EPA officials are now seeking additional cooperation to expedite the implementation of this agreement. The deletion of the \$1.3 million for expanded nonpoint pollution management extension projects in the FY 80 budget has delayed the anticipated, strengthened, cooperative support.

Appropriation of the previously requested \$1.3 million in 1981 would significantly assist State Cooperative Extension Services to provide the expanded extension cooperation being sought by U.S. EPA for improved management of nonpoint sources of pollution.

Nature of Change. These funds will be used to expand assistance in the area and State nonpoint planning and in providing assistance to private landowners. Farmers will be encouraged to adopt "best management practices" for controlling or preventing nonpoint source pollutants from croplands, rangelands, and forests and the subsequent degradation of streams, lakes, and underground water resources. These programs will help meet the objectives of Section 208 of P.L. 92-500, the Clean Water Act of 1977, the Safe Drinking Water Act, the Clean Air Act, the Resources Conservation Act, and the Toxic Substances Control Act.

5. An increase of \$100,000 for increased costs of operations for the National Agricultural Pesticide Impact Assessment Program (NAPIAP) (\$1,735,000 available in 1980).

Need for Change. The USDA/University National Agricultural Pesticide Impact Assessment Program provides pesticide data and professional judgments on current uses of specific pesticides, benefits, and efficacy of other chemical and non-chemical control procedures for EPA, RPAR pesticides. These data and judgments are reviewed in a joint effort with EPA in re-registering pesticides. The Cooperative Extension Service is an important and essential link for providing information for this process. The increase requested will enable the State Extension Services to maintain their current level of support for the NAPIAP. Funds for this program are allocated to the State Cooperative Extension Services to allow use of professional Extension specialists to carry out the State Pesticide Impact Assessment Programs. Without the State staff support, data required in the studies on some 100 pesticides cannot be collected because the pesticide impact assessment work is an add-on program for staffs already fully committed to other ongoing educational programs needed by Extension clientele.

Rising salaries and increased costs of services, supplies, materials and equipment, have made it increasingly difficult for Extension to employ and maintain State Extension Specialists who have the background and understanding of the local, State, and regional pesticide programs and practices essential to the success of this program. Additional funds would enable the States to meet anticipated increases in these costs in FY 1981 and maintain current staffing and program levels.

Nature of Change. This increase will provide for increased operating costs in FY 1981 and enable the States to conduct the program at basically the same level as in FY 1980.

- (2) A decrease in funds authorized under Title V of the Rural Development Act of 1972 (\$2.5 million).

Need for Change. This proposal eliminates the earmarked program in FY 1981 which is currently being funded under Title V of the Rural Development Act of 1972. As in the case with items noted in section (1) (b) 3 , similar extension activities are being carried out by the State Extension Services from funds available to them under the formula provisions (sections 3(b) and (c)) of the Smith-Lever Act, and from other State and county extension appropriations. At their discretion, State Extension Services may continue to provide additional assistance in these areas by realigning their allocations of available resources.

Nature of Change. This change would eliminate direct federal support for these programs. States could continue these programs by using formula funds if they desire to do so.

(3) An increase of \$636,000 in funds authorized under section 1444 of the Food and Agriculture Act of 1977 (\$10,453,000 available in 1980).

(a) An increase of \$636,000 in payments to the 1890 Land-Grant Institutions and Tuskegee Institute for increased cost of operations.

Need for Change. Section 1444 of the Food and Agriculture Act of 1977 authorized these institutions to administer extension programs on their own. In past years, the 1862 Institutions, acting as the senior partner and possessing the necessary capability, provided administrative and other support services as needed by the 1890 land-grant institutions and Tuskegee Institute to carry out their programs.

These funds are requested to enable these institutions to handle their new management responsibilities as well as to meet increases in salaries, wages, benefits, supplies, materials and equipment, and to the extent possible, to provide greater emphasis on programs that benefit small farm operators and their families.

Nature of Change. These funds will provide for increases in payments to these institutions and would be allocated according to the distribution specified under section 1444 of the Food and Agriculture Act of 1977.

(4) An increase of \$413,000 for Federal Administration and Coordination (direct appropriation) for fiscal year 1980 pay increases (\$6,543,000 available in 1980).

PAYMENTS TO STATES, PUERTO RICO, GUAM, AND THE VIRGIN ISLANDS

Federal funds available for fiscal year 1980 under the appropriation "Payments to States" for cooperative agricultural extension work under the Smith-Lever Act, the D. C. Public Postsecondary Education Reorganization Act, the Rural Development Act of 1972, and section 1444 of the National Agricultural Research, Extension and Teaching Policy Act of 1977 total \$267,494,000. In addition, \$11,500,000 was appropriated under section 22 of the Bankhead-Jones Act for support of instruction in agriculture, the mechanic arts, and related fields at the Land-Grant colleges.

Amounts appropriated are made available to States, Puerto Rico, Guam and the Virgin Islands by letter of credit. Funds are disbursed in accordance with budgets and plans of work submitted by the States and approved by SEA-Extension on behalf of the Secretary of Agriculture. As reflected in Table III, about 40 percent of the cost of Extension work at present is being financed from Federal sources and about 60 percent from State and local sources.

The funds are used by the States for the employment of Extension workers to carry on cooperative agricultural extension work. Paid Extension workers are assisted by volunteer leaders who cooperate in carrying out Extension programs.

The use of these funds is indicated in greater detail in the following tables: Table I reflects estimated allotments to States, Puerto Rico, Guam, and the Virgin Islands under the formula provisions of Sections 3(b) and 3(c) of the Smith-Lever Act. Supplementary Tables 1A, 1B, 1C, 1D, and 1E reflect the estimated allotments for pesticide impact assessment and food and human nutrition education (EFNEP) under Section 3(d) (Non-formula) of the Act, payments to the 1890 Land-Grant Colleges and Tuskegee Institute, payments for rural development extension education under the Rural Development Act, Title V, and payments under Section 22 of the Bankhead-Jones Act. Table II shows the basis on which the allotments will be made and the extent to which they must be matched by the State and local sources. Table III indicates the sources of funds allotted for Cooperative Extension work in the States, Puerto Rico, Guam, and the Virgin Islands for fiscal year 1980. Table IV indicates the various classes of field agents employed with Extension funds.

Table 1

APPROPRIATIONS FOR PAYMENTS TO STATES, STATE ALLOTMENTS, FY 1980-1981

Smith-Lever Act: Sections 3(b) and 3(c)	FY-1980	Inc. or Dec. FY 1981	Total Proposed for FY 1981
Alabama	4,264,779	\$ + 238,610	4,503,389
Alaska	550,516	+54,713	605,229
Arizona	992,888	+82,714	1,075,602
Arkansas	3,526,585	+208,138	3,734,723
California	4,024,725	+282,443	4,307,168
Colorado	1,566,160	+123,909	1,690,069
Connecticut	1,172,142	+104,475	1,276,617
Delaware	654,807	+59,790	714,597
Florida	2,271,273	+184,823	2,456,096
Georgia	4,644,274	+275,949	4,920,223
Guam	501,851	+47,029	548,880
Hawaii	746,870	+55,185	802,055
Idaho	1,374,442	+116,098	1,490,540
Illinois	5,203,341	+413,096	5,616,437
Indiana	4,611,853	+380,268	4,992,121
Iowa	4,883,948	+401,829	5,285,777
Kansas	2,939,622	+225,054	3,164,676
Kentucky	5,107,052	+360,901	5,467,953
Louisiana	3,097,413	+199,230	3,296,643
Maine	1,190,291	+92,585	1,282,876
Maryland	1,812,838	+147,355	1,960,193
Massachusetts	1,479,979	+121,874	1,601,853
Michigan	4,753,352	+370,485	5,123,837
Minnesota	4,614,564	+377,697	4,992,261
Mississippi	4,487,451	+248,446	4,735,897
Missouri	4,665,068	+338,509	5,003,577
Montana	1,302,610	+109,877	1,412,487
Nebraska	2,621,216	+209,752	2,830,968
Nevada	554,696	+53,174	607,870
New Hampshire	809,861	+72,178	882,039
New Jersey	1,452,273	+122,127	1,574,400
New Mexico	1,090,878	+85,618	1,176,496
New York	4,550,851	+350,878	4,901,729
North Carolina	6,938,036	+458,546	7,396,582
North Dakota	1,837,120	+147,556	1,984,676
Ohio	5,744,980	+442,940	6,187,920
Oklahoma	3,082,768	+197,499	3,280,267
Oregon	1,825,620	+149,452	1,975,072
Pennsylvania	5,677,015	+427,215	6,104,230
Puerto Rico	4,619,068	+294,723	4,913,791
Rhode Island	559,241	+52,750	611,991
South Carolina	3,468,270	+207,964	3,676,234
South Dakota	1,880,256	+154,905	2,035,161
Tennessee	5,035,311	+334,286	5,369,597
Texas	6,986,231	+422,647	7,408,878
Utah	881,888	+71,895	953,783
Vermont	925,028	+79,473	1,004,501
Virginia	4,179,446	+278,208	4,457,654
Virgin Islands	485,507	+45,686	531,193
Washington	2,185,863	+173,978	2,359,841
West Virginia	2,446,076	+156,632	2,602,708
Wisconsin	4,609,907	+375,885	4,985,792
Wyoming	778,671	+68,311	846,982
Subtotal	\$151,666,771	11,055,360	162,722,131
Special Needs, Sec 3(b), Smith-Lever Act	1,544,909	--	1,544,909
Retirement and Employees' Compensation Costs	16,033,000	--	16,033,000
Penalty Mail Costs (Ext. Agents & Directors)	16,245,000	--	16,245,000
Fed. Admin. & Coord., Sec. 3(c)1, S-L Act	3,841,320	+460,640	4,301,960
Funds for Allocation, Sec. 3(d), S-L Act:			
Pesticide Impact Assessment 1/	1,735,000	+100,000	1,835,000
Food and Nutrition Education 1/	51,810,000	+4,152,000	55,962,000
Pest Management	6,435,000	+1,000,000	7,435,000
Farm Safety	1,020,000	-1,020,000	--
Urban Gardening	3,000,000	-3,000,000	--
Non-point Source Pollution	--	+1,300,000	1,300,000
Energy	300,000	--	300,000
Sec. 1444, P.L. 95-113, 1890 Program 1/	10,453,000	+636,000	11,089,000
D.C. Act, including Fed. Admin.	910,000	--	910,000
Title V, Rural Development Act 1/	2,500,000	-2,500,000	--
Sec. 22, Bankhead-Jones Act 1/	11,500,000	--	11,500,000
TOTAL.....	\$278,994,000	\$ +12,184,000	291,178,000

1/ See Tables 1A,1B,1C,1D and 1E.

Table 1A

APPROPRIATIONS FOR PAYMENTS TO STATES
PESTICIDE IMPACT ASSESSMENT, FY 1980 - 1981

Smith-Lever Act: Section 3(d)	Fiscal Year 1980	Increase or Decrease		Total Proposed Fiscal Year 1981
			Fiscal Year 1981	
Alabama	\$ 25,790	\$ +	1,653	\$ 27,443
Alaska	8,536	+	49	8,585
Arizona	18,903	+	1,012	19,915
Arkansas	40,681	+	3,038	43,719
California	89,780	+	7,601	97,381
Colorado	19,988	+	1,114	21,102
Connecticut	11,446	+	320	11,766
Delaware	11,212	+	298	11,510
Florida	36,490	+	2,648	39,138
Georgia	57,372	+	4,589	61,961
Guam	8,676	+	62	8,738
Hawaii	11,470	+	322	11,792
Idaho	19,765	+	1,094	20,859
Illinois	81,241	+	6,806	88,047
Indiana	41,864	+	3,147	45,011
Iowa	77,978	+	6,504	84,482
Kansas	34,802	+	2,491	37,293
Kentucky	22,237	+	1,324	23,561
Louisiana	24,524	+	1,536	26,060
Maine	14,090	+	566	14,656
Maryland	17,291	+	864	18,155
Massachusetts	14,917	+	643	15,560
Michigan	34,126	+	2,428	36,554
Minnesota	52,413	+	4,128	56,541
Mississippi	40,957	+	3,063	44,020
Missouri	37,577	+	2,749	40,326
Montana	17,197	+	855	18,052
Nebraska	52,125	+	4,101	56,226
Nevada	9,904	+	177	10,081
New Hampshire	9,697	+	158	9,855
New Jersey	15,424	+	690	16,114
New Mexico	12,202	+	390	12,592
New York	30,943	+	2,132	33,075
North Carolina	46,672	+	3,594	50,266
North Dakota	21,578	+	1,263	22,841
Ohio	42,629	+	3,218	45,847
Oklahoma	28,165	+	1,873	30,038
Oregon	21,398	+	1,245	22,643
Pennsylvania	25,770	+	1,652	27,422
Puerto Rico	8,567	+	52	8,619
Rhode Island	10,622	+	244	10,866
South Carolina	27,007	+	1,766	28,773
South Dakota	20,486	+	1,161	21,647
Tennessee	24,163	+	1,503	25,666
Texas	79,544	+	6,650	86,194
Utah	11,844	+	358	12,202
Vermont	10,394	+	222	10,616
Virginia	24,824	+	1,563	26,387
Virgin Islands	8,567	+	52	8,619
Washington	27,789	+	1,839	29,628
West Virginia	11,723	+	345	12,068
Wisconsin	35,610	+	2,566	38,176
Wyoming	11,030	+	282	11,312
Special Projects	235,000	--		235,000
TOTAL	\$ 1,735,000	\$ + 100,000		\$ 1,835,000

Table 1B

APPROPRIATIONS FOR PAYMENTS TO STATES
FOOD AND HUMAN NUTRITION EDUCATION FY 1980-1981

Smith-Lever Act Section 3(d)	Fiscal Year 1980	Increase or Decrease		Total Proposed For FY 1981
			Fiscal Year 1981	
Alabama	\$ 1,727,752	\$ +	90,718	\$ 1,818,470
Alaska	148,441	+	9,585	158,026
Arizona	475,969	+	32,280	508,240
Arkansas	1,100,398	+	57,811	1,158,209
California	2,734,072	+	218,657	2,952,729
Colorado	471,306	+	31,996	503,302
Connecticut	382,936	+	27,173	410,109
Delaware	190,294	+	11,855	202,149
Florida	1,732,201	+	113,412	1,845,613
Georgia	1,880,502	+	97,242	1,977,744
Hawaii	222,597	+	12,989	235,586
Idaho	250,799	+	15,259	266,058
Illinois	1,819,671	+	115,965	1,935,636
Indiana	1,044,668	+	54,974	1,099,642
Iowa	792,083	+	37,669	829,752
Kansas	599,279	+	33,414	632,693
Kentucky	1,449,328	+	77,101	1,526,429
Louisiana	1,612,366	+	98,093	1,710,459
Maine	366,135	+	19,230	385,365
Maryland	721,865	+	44,194	766,059
Massachusetts	825,462	+	52,987	878,449
Michigan	1,539,722	+	87,029	1,626,751
Minnesota	863,377	+	45,328	908,705
Mississippi	1,492,193	+	81,923	1,574,116
Missouri	1,347,419	+	72,561	1,419,980
Montana	255,350	+	15,258	270,608
Nebraska	468,381	+	24,619	493,000
Nevada	144,228	+	10,435	154,663
New Hampshire	204,170	+	12,421	216,591
New Jersey	902,205	+	62,916	965,121
New Mexico	433,553	+	28,591	462,144
New York	2,864,060	+	202,203	3,066,263
North Carolina	2,220,044	+	104,333	2,324,377
North Dakota	300,854	+	15,258	316,112
Ohio	1,889,665	+	108,872	1,998,537
Oklahoma	907,031	+	52,136	959,167
Oregon	415,689	+	29,442	445,131
Pennsylvania	2,329,265	+	127,311	2,456,576
Puerto Rico	1,043,776	+	178,941	1,222,717
Rhode Island	260,238	+	16,109	276,347
South Carolina	1,339,830	+	64,902	1,404,732
South Dakota	338,402	+	18,095	356,497
Tennessee	1,726,965	+	88,731	1,815,696
Texas	3,621,789	+	208,160	3,829,949
Utah	260,913	+	17,811	278,724
Vermont	203,741	+	11,286	215,027
Virginia	1,475,505	+	74,263	1,549,768
Washington	574,340	+	39,371	613,711
West Virginia	853,602	+	43,626	897,228
Wisconsin	823,344	+	47,597	870,941
Wyoming	162,225	+	9,868	172,093
Nutrition Studies	--	+ 1,000,000		1,000,000
TOTAL	\$51,810,000	\$ + 4,152,000		\$ 55,962,000

Table 1C

APPROPRIATIONS FOR PAYMENTS TO THE 1890 LAND-GRANT COLLEGES
AND TUSKEGEE INSTITUTE, FY 1980 - 1981

Food & Agriculture Act: Sec. 1444	Fiscal Year 1980	Inc. or Dec. FY 1981	Proposed for FY 1981
. ALABAMA:			
Alabama A&M University	\$ 566,048	\$ + 33,102	\$ 599,150
Tuskegee Institute	566,048	+ 33,102	599,150
ARKANSAS:			
Univ. of Arkansas at Pine Bluff	489,136	+ 29,324	518,460
DELWARE:			
Delaware State College	194,367	+ 9,542	203,909
FLORIDA:			
Florida A&M University	432,011	+ 25,758	457,769
GEORGIA:			
Fort Valley State College	634,770	+ 37,907	672,677
KENTUCKY:			
Kentucky State University	759,563	+ 49,940	809,503
LOUISIANA:			
Southern Univ. and A&M College	471,620	+ 27,834	499,454
MARYLAND:			
Univ. of Maryland Eastern Shore	364,154	+ 20,949	385,103
MISSISSIPPI:			
Alcorn State University	596,276	+ 34,655	630,931
MISSOURI:			
Lincoln University	722,362	+ 46,967	769,329
NORTH CAROLINA:			
North Carolina A&T State Univ.	1,000,084	+ 62,276	1,062,360
OKLAHOMA:			
Langston University	454,086	+ 27,985	482,071
SOUTH CAROLINA:			
South Carolina State College	512,100	+ 28,927	541,027
TENNESSEE:			
Tennessee State University	736,420	+ 46,176	782,596
TEXAS:			
Prairie View A&M University	905,250	+ 57,794	963,044
VIRGINIA:			
Virginia State College	630,585	+ 38,322	668,907
Federal Administration	418,120	+ 25,440	443,560
TOTAL	\$10,453,000	\$ +636,000	\$11,089,000

Table 1D

APPROPRIATIONS FOR PAYMENTS TO STATES
TITLE V OF RURAL DEVELOPMENT ACT OF 1972
FY 1980-1981

	Fiscal Year 1980	Increase or Decrease Fiscal Year 1981	Total Proposed FY 1981
Alabama	\$ 46,580	\$ - 46,580	\$ --
Alaska	12,233	- 12,233	--
Arizona	17,463	- 17,463	--
Arkansas	40,882	- 40,882	--
California	54,770	- 54,770	--
Colorado	25,153	- 25,153	--
Connecticut	21,533	- 21,533	--
Delaware	13,180	- 13,180	--
Florida	36,542	- 36,542	--
Georgia	53,558	- 53,558	--
Hawaii	12,320	- 12,320	--
Idaho	23,691	- 23,691	--
Illinois	79,148	- 79,148	--
Indiana	73,022	- 73,022	--
Iowa	77,027	- 77,027	--
Kansas	44,032	- 44,032	--
Kentucky	69,400	- 69,400	--
Louisiana	39,228	- 39,228	--
Maine	19,308	- 19,308	--
Maryland	29,539	- 29,539	--
Massachusetts	24,785	- 24,785	--
Michigan	71,212	- 71,212	--
Minnesota	72,527	- 72,527	--
Mississippi	48,410	- 48,410	--
Missouri	65,219	- 65,219	--
Montana	22,530	- 22,530	--
Nebraska	41,172	- 41,172	--
Nevada	11,944	- 11,944	--
New Hampshire	15,497	- 15,497	--
New Jersey	24,830	- 24,830	--
New Mexico	18,003	- 18,003	--
New York	67,562	- 67,562	--
North Carolina	87,655	- 87,655	--
North Dakota	29,561	- 29,561	--
Ohio	84,738	- 84,738	--
Oklahoma	38,893	- 38,893	--
Oregon	29,925	- 29,925	--
Pennsylvania	81,826	- 81,826	--
Puerto Rico	57,042	- 57,042	--
Rhode Island	11,865	- 11,865	--
South Carolina	40,861	- 40,861	--
South Dakota	30,933	- 30,933	--
Tennessee	64,437	- 64,437	--
Texas	80,942	- 80,942	--
Utah	15,440	- 15,440	--
Vermont	16,857	- 16,857	--
Virginia	53,977	- 53,977	--
Washington	34,508	- 34,508	--
West Virginia	31,275	- 31,275	--
Wisconsin	72,195	- 72,195	--
Wyoming	14,770	- 14,770	--
4% Federal Administration	100,000	-100,000	--
10% to Finance work in two or more States	250,000	-250,000	--
TOTAL	\$2,500,000	\$-2,500,000	--

Table 1E

APPROPRIATIONS FOR PAYMENTS TO STATES
UNDER SECTION 22, BANKHEAD-JONES ACT FY 1980 - 1981

	Fiscal Year 1980	Increase or Decrease Fiscal Year 1981	Total Proposed for FY 1981
Alabama	\$ 206,833	\$ --	\$ 206,833
Alaska	154,986	--	154,986
Arizona	179,248	--	179,248
Arkansas	181,737	--	181,737
California	479,252	--	479,252
Colorado	186,423	--	186,423
Connecticut	200,036	--	200,036
Delaware	159,044	--	159,044
D. C.	162,483	--	162,483
Florida	262,035	--	262,035
Georgia	225,734	--	225,734
Guam	151,403	--	151,403
Hawaii	162,705	--	162,705
Idaho	161,766	--	161,766
Illinois	333,395	--	333,395
Indiana	235,702	--	235,702
Iowa	196,617	--	196,617
Kansas	187,113	--	187,113
Kentucky	203,123	--	203,123
Louisiana	210,117	--	210,117
Maine	166,397	--	166,397
Maryland	214,725	--	214,725
Massachusetts	243,879	--	243,879
Michigan	296,450	--	296,450
Minnesota	212,789	--	212,789
Mississippi	186,582	--	186,582
Missouri	227,183	--	227,183
Montana	161,459	--	161,459
Nebraska	174,484	--	174,484
Nevada	158,065	--	158,065
New Hampshire	162,173	--	162,173
New Jersey	268,284	--	268,284
New Mexico	166,765	--	166,765
New York	450,171	--	450,171
North Carolina	233,861	--	233,861
North Dakota	160,194	--	160,194
Ohio	325,772	--	325,772
Oklahoma	192,231	--	192,231
Oregon	184,511	--	184,511
Pennsylvania	344,614	--	344,614
Puerto Rico	194,752	--	194,752
Rhode Island	165,672	--	165,672
South Carolina	192,747	--	192,747
South Dakota	160,994	--	160,994
Tennessee	214,754	--	214,754
Texas	334,760	--	334,760
Utah	167,479	--	167,479
Vermont	157,339	--	157,339
Virginia	226,706	--	226,706
Virgin Islands	151,031	--	151,031
Washington	206,256	--	206,256
West Virginia	178,782	--	178,782
Wisconsin	222,902	--	222,902
Wyoming	155,485	--	155,485
TOTAL	\$11,500,000	--	\$11,500,000

Table II

APPROPRIATION FOR PAYMENTS TO STATES

Basis of Allotment and Matching Required, Fiscal Year 1981

Table III

SOURCES OF FUNDS ALLOTTED FOR COOPERATIVE EXTENSION WORK
For Fiscal Year Ending September 30, 1980

States	Grand Total	Total Federal Funds	Funds from Federal Sources				Funds from Non-Federal Sources		
			Total Within States	Smith-Lever Act	Title V, RD Act of 1972	PL 95-113 Sec. 1444	State (est.)	County (est.)	Non-Tax (est.)
Alabama	18,265,148	7,452,157	10,812,991	6,273,481	46,580	1,132,096	8,916,378	1,680,093	216,520
Alaska	2,625,726	815,726	1,810,000	803,493	12,233	-	1,810,000	-	-
Arizona	5,699,563	1,707,223	3,961,640	1,690,460	17,463	-	3,045,000	224,676	721,504
Arkansas	15,092,096	5,453,072	9,639,024	4,923,054	40,882	489,136	8,640,052	980,717	18,255
California	34,386,439	7,372,347	27,014,092	7,317,577	54,770	-	20,895,021	4,675,996	1,443,075
Colorado	10,817,387	2,241,607	8,575,780	2,216,454	25,153	-	4,927,775	3,088,772	559,233
Connecticut	3,474,864	1,651,057	1,823,807	1,629,524	21,533	-	1,748,667	-	75,140
Delaware	1,962,680	1,126,860	835,820	919,313	13,180	194,367	667,376	17,500	150,944
Florida	20,674,933	4,799,517	15,875,476	4,330,964	36,542	432,011	7,950,546	7,689,930	235,000
Georgia	26,218,735	7,731,431	18,487,304	7,043,103	53,558	634,770	13,406,125	3,417,127	1,664,052
Guam	828,702	519,527	309,175	519,527	-	-	309,175	-	-
Hawaii	3,190,286	1,056,257	2,134,029	1,043,937	12,320	-	2,134,029	-	-
Idaho	6,082,224	1,833,977	4,248,247	1,810,286	23,691	-	2,866,200	1,172,447	209,600
Illinois	20,498,541	7,702,401	12,796,140	7,623,253	79,148	-	10,387,100	1,403,991	1,005,049
Indiana	16,644,719	5,939,407	10,705,312	5,866,385	73,022	-	5,069,218	4,896,182	739,912
Iowa	18,414,036	6,050,036	12,364,000	5,973,009	77,022	-	7,690,000	4,540,000	134,000
Kansas	17,826,161	3,798,235	14,027,926	3,754,203	44,032	-	5,331,594	6,498,602	2,197,730
Kentucky	18,244,173	7,496,580	10,747,593	6,667,617	69,400	759,563	7,459,910	3,287,683	-
Louisiana	17,054,756	5,669,491	11,385,265	5,158,643	39,228	471,620	10,814,207	558,035	13,023
Maine	3,547,764	1,678,824	1,868,940	1,659,516	19,308	-	1,566,204	283,236	19,500
Maryland	10,044,988	3,184,687	6,660,301	2,790,994	29,539	364,154	4,966,325	1,875,976	18,000
Massachusetts	5,777,650	2,584,143	3,193,507	2,559,358	24,785	-	1,001,606	2,191,901	-
Michigan	23,118,938	6,689,412	16,429,526	6,618,200	71,212	-	11,180,500	5,249,026	-
Minnesota	18,115,255	5,795,881	12,319,374	5,723,354	72,527	-	8,048,071	4,115,993	155,310
Mississippi	17,677,064	6,987,017	10,690,047	6,342,331	48,410	596,276	8,964,128	1,486,159	239,760
Missouri	18,769,019	7,197,030	11,571,989	6,409,449	65,219	722,362	8,680,805	1,976,529	914,655
Montana	5,151,690	1,780,987	3,370,703	1,758,457	22,530	-	1,507,447	1,701,137	162,119
Nebraska	12,417,865	3,420,194	8,997,671	3,379,022	41,172	-	5,275,361	3,204,537	517,773
Nevada	3,279,890	860,872	2,419,018	848,928	11,944	-	1,659,447	759,571	-
New Hampshire	2,568,202	1,102,225	1,465,977	1,086,728	48,410	-	788,105	663,392	14,480
New Jersey	8,494,370	2,633,732	5,860,638	2,608,902	24,830	-	3,270,060	2,590,578	-
New Mexico	4,677,944	1,715,136	2,962,808	1,697,133	18,003	-	2,215,800	747,008	-
New York	27,664,715	8,128,416	19,536,299	8,060,854	67,562	-	5,515,757	12,221,278	1,800,000
North Carolina	29,270,919	10,510,401	7,422,662	87,655	1,000,084	-	13,072,618	5,500,000	187,900
North Dakota	6,656,786	2,352,113	4,304,673	2,322,552	29,561	-	2,372,490	1,475,002	457,181
Ohio	20,772,395	8,105,012	12,667,383	8,020,274	84,738	-	6,365,883	5,681,500	620,000
Oklahoma	13,623,684	4,742,193	8,881,491	4,249,214	38,893	454,086	5,515,757	2,530,562	835,172
Oregon	10,788,717	2,445,632	8,343,085	2,415,707	29,925	-	6,262,731	2,080,534	-
Pennsylvania	15,853,876	8,378,876	7,475,000	8,297,050	81,826	-	4,850,000	2,625,000	-
Puerto Rico	9,766,485	5,775,453	3,991,032	5,718,411	57,042	-	3,123,095	559,725	308,212
Rhode Island	1,527,381	895,966	631,415	884,101	11,865	-	568,415	63,000	-
South Carolina	15,334,911	5,597,153	9,737,758	5,044,192	40,861	512,100	9,672,458	57,500	7,800
South Dakota	6,259,679	2,395,077	3,864,602	2,364,144	30,933	-	2,701,452	1,147,114	16,036
Tennessee	17,921,774	7,926,386	9,995,388	7,125,529	64,437	-	7,789,408	2,018,844	187,136
Texas	39,227,283	12,548,561	26,778,722	11,562,369	80,942	-	19,470,038	7,127,738	180,946
Utah	4,861,822	1,328,085	3,533,737	1,312,645	15,440	-	2,799,902	688,835	45,000
Vermont	2,967,046	1,222,020	1,74,026	1,205,163	16,857	-	1,476,290	238,166	30,570
Virginia	22,710,337	6,473,337	16,231,000	5,794,775	53,977	630,585	12,127,000	4,104,000	-
Virgin Islands	653,074	503,074	150,000	503,074	-	-	150,000	-	-
Washington	11,321,692	2,937,500	8,384,192	2,902,992	34,508	-	5,671,774	2,712,418	-
West Virginia	7,061,706	3,396,676	3,665,030	3,365,401	31,275	-	1,905,519	1,749,635	9,876
Wisconsin	20,403,147	5,832,056	14,571,091	5,759,861	72,195	-	7,966,283	6,350,029	254,779
Wyoming	3,285,528	1,074,696	2,210,832	1,059,926	14,770	-	1,488,316	722,514	-
Unallotted	1,324,129	1,324,129	-	1,074,129	250,000	-	-	-	-
GRAND TOTAL	660,998,954	229,946,560	451,052,394	217,511,680	2,400,000	10,034,880	304,057,144	130,630,008	16,365,242

1/ D. C. Public Postsecondary Education Reorganization Act

District of Columbia

825,600

Table IV

COOPERATIVE EXTENSION AGENTS, BY ORGANIZATION CLASSES
(Staff-Year Equivalents)

Extension Workers by Organization Classes	:	Fiscal Year 1978	:	Fiscal Year 1979	:	Fiscal Year 1980	:
<u>State Workers:</u>	:		:		:		:
Directors and Administrative personnel.....	:	481	:	487	:	493	:
Specialists.....	:	4,210	:	3,616	:	3,714	:
Total, State Staff.....	:	4,691	:	4,103	:	4,207	:
<u>County Workers:</u>	:		:		:		:
Leaders and Supervisors.....	:	688	:	696	:	694	:
Area Agents.....	:	1,360	:	732	:	664	:
County Extension Agents.....	:	9,741	:	11,342	:	11,450	:
Total, County Staff.....	:	11,789	:	12,770	:	12,808	:
Grand Total.....	:	16,480	:	16,873	:	17,015 ^{1/}	:

^{1/} Estimate based on preliminary data available at the beginning of the fiscal year.

STATUS OF PROGRAM

SEA-Extension is the educational arm of the U.S. Department of Agriculture (USDA) and the Federal member of a nationwide educational delivery system that reaches into virtually every county in the United States and its territories. The education is off-campus and informal. It is conducted by the State Cooperative Extension Services, which are a part of the Nation's land-grant universities.

The "educators" include some 16,000 Cooperative Extension agents and approximately 7,000 aides or paraprofessionals, as well as hundreds of thousands of volunteers. The "students" are farmers, businessmen, families, youth, consumers, and community leaders. Backing up the system is the research competency of the land-grant universities, SEA-Agricultural Research, and program agencies of USDA, such as Food and Nutrition Service, Farmers Home Administration, and Soil Conservation Service.

It is a grassroots system with local people, land-grant universities, and USDA sharing the responsibility of determining educational needs and program design. Currently, programs are organized under the categories of agriculture, natural resources, home economics (including family education and food and nutrition), community development, and 4-H youth development. National concerns now addressed under these categories include integrated pest management, pollution, energy conservation, nutrition education, management of private forest lands, and the needs of small farmers.

As a full partner in the State-Federal system, SEA-Extension provides leadership, ideas, and funds. Federal funds account for about 40 percent of the total dollars spent on Extension education. State and county funds account for the remainder. The private sector also provides significant support to the 4-H youth programs of the Extension system.

Some 60 percent of the Federal funds for Extension are administered by SEA-Extension under the formula provisions of the Smith-Lever Act. Other special appropriations include nutrition education for low-income people, Extension programs conducted by 1890 land-grant colleges and Tuskegee, farm safety, pest management, pesticide impact assessment, and urban gardening.

Payments Under the Smith-Lever Act and Section 1444 of P.L. 95-113

Funds appropriated under the Smith-Lever Act represent a major portion of the total Federal payments to 1862 State Extension Services in support of the national Extension program. These funds are distributed to each State, Puerto Rico, Guam, and the Virgin Islands primarily on the basis of farm and rural populations and also on the basis of special problems and needs.

Sixteen border and southern States are using funds appropriated under Section 1444 of P.L. 95-113 for 1890 colleges and Tuskegee Institute to support Extension projects designed to develop and improve informed decisionmaking skills. These Extension Services are continuing to develop improved instructional materials and program delivery methodologies to better service previously unreached clientele. State Extension systems are applying this support to increase services to all clientele, especially those with limited resources.

Funds from the Smith-Lever Act and Section 1444 are used primarily for the employment of State, area, and county Extension personnel, who work with individuals, families, community organizations, business firms, and others. Extension personnel provide advice and assist in the application of improved methods for agriculture production and marketing, forestry and natural resources, human nutrition, family living, community and rural development, and 4-H youth development.

The following is a description of current activities and selected examples of accomplishments from these appropriated funds.

AGRICULTURE

Current Activities: Approximately 38 percent of Extension's professional staff time is devoted to agricultural programs. During the past year, an evaluation of agricultural programs revealed that we are reaching approximately 60 percent of the agricultural producers in the country by direct contact. This excludes contacts through mass media, which are also important. A study of 147 randomly-selected issues of 38 farm magazines indicated that more than 21 percent of all column inches of news was contributed by land-grant university sources. Extension sources provided 65.6 percent of the total provided by land-grant sources.

During 1979, a 1967 survey on work with other Agencies at the national level was updated. Survey findings indicated that the national SEA-Extension staff worked with 22 USDA Agencies, 45 Agencies and commissions outside the USDA, and 11 departments of government. They also worked with and related directly to 200 national organizations and professional societies. An agreement was developed with EPA during the year to provide for closer cooperation between State Extension Services and State water quality agencies related to the 208 program.

The allocation of resources among components of the agricultural program remained about the same as last year, with approximately 67 percent of the professional staff time allocated to crop and livestock production, 12 percent to farm and business management, and 7 percent to marketing and farm supplies. A study by Robert Evenson, Yale University, for 1948-71 indicated that public sector agricultural research, Extension education, and the level of education of farmers together may account for 50 percent of the agricultural productivity growth during that period. The results of this study suggest that Extension's contribution to productivity growth associated with technical change has been substantial because it complements agricultural research. In addition to technical efficiency, which increases output and has reduced costs, Extension agricultural programs have increased economic efficiency by facilitating decisionmaking skills of farmers and their ability to make improved and rapid resource allocation adjustments in response to changing prices and other conditions.

Selected Examples of Recent Progress:

Pest Management: In 1979, approximately 15 to 16 million acres were under some type of pest management program. It is estimated that more than 48,000 producers were involved in these programs and are using improved Integrated Pest Management (IPM) practices. In addition, several State Extension Services have initiated or are planning urban and 4-H IPM projects. Depending on the type of local agriculture, crops involved, and pest complexes, the crop average varies from 13 acres (0.3 percent of total acreage--three apple growers in Vermont) to 295,000 acres (85 percent of total acreage) of cotton in Alabama during 1979.

In 33 State Extension programs, growers reported that they paid from \$1 to \$5 per acre to have their fields scouted. Twenty-eight programs reported reduced use of insecticides, 16 reported increased use of insecticides, and the remaining indicated no change. Changes in herbicides used were not as dramatic. Forty-five programs reported using the same amount, 4 reported using less, and 4 reported using more.

Nematicide use was the same in 26 projects, reduced in 3, and increased in 9. Fungicide use was reduced in 9 programs, increased in 4 programs, and remained the same in 33. Thirty-one programs indicated an increase in yield, 22 programs indicated no change, and only one program, indicated a decline in yield. Net profits increased in 28 programs, and only 6 reported reductions in profits. The increase in profit was related not only to more effective use of pesticides but also to improved farm management practices.

Boll Weevil Trials: The second of the 3-year boll weevil trials was completed in FY 1979. Boll weevils are the key pest of cotton and cost farmers nearly \$250 million in crop losses and another \$90 million in pesticide use each year. Boll weevil control has accounted for nearly a third of the insecticides used in U.S. agriculture over the years.

An optimum pest management trial is being conducted in Panola County, Mississippi by SEA-Extension and Mississippi Extension. Its objective is to determine if the boll weevil and other cotton pests can be kept below damaging levels by voluntary participation of growers in pest management techniques. This program will be compared with the eradication trial and current insect eradication programs. The tools used in the eradication trial also will be used in the optimum pest management trial except that there will be a sterile insect release program.

The optimum pest management trial is on schedule and meeting its goals. Anticipated completion is FY 1980. In 1979, 99.6 percent of farmers in the area were participating. Only 100 acres are not in the 32,500-acre program. Before the projects began, no private IPM consultants were operating in the county. In 1979, 25,000 acres were scouted by private consultants. The remaining program acres were scouted by grower IPM organizations. Growers pay all costs for scouting, and Extension provides training and information materials. Boll weevil trap catches in 1978 ran 50 percent less in August and September than in 1977. Diapause applications were initiated in September 1978 to reduce overwintering populations. In the spring of 1979, there was a 78 percent reduction in overwintering weevils from 1978. Only 3.4 insecticide applications were applied in 1979 for in-season insect control. Several years ago most fields would have required extensive sprayings by July.

Pesticide Applicator Training: During FY 79, the State Cooperative Extension Services provided training for about 292,000 commercial applicators (approximately 94 percent of the total). An estimated 2,039,200 private applicators (approximately 84 percent) already have received initial training. About 25 percent of these applicators will be retrained each year. The program costs for the 50 States, Guam, Virgin Islands, Puerto Rico, and the District of Columbia were \$5.4 million, with \$3.2 million contributed from the State Cooperative Extension Services and \$2.2 million contributed from EPA through SEA-Extension. Recertification is an ongoing program in almost every State.

Agricultural Weather: The "Green Thumb" Agricultural Weather Pilot Program in Kentucky is underway. The University of Kentucky has contracted for equipment, and deliveries are planned for the fall of 1979, with the program to be in place and tested during the 1980 growing season. The touchtone network phase of the program is being carried out on a pilot basis in 13 States. In this program, volunteers provide specific weather information for their communities. A project is underway in North Carolina to determine how weather products available from the National Weather Service (NWS) can be used most efficiently in programs to help farmers make production and marketing decisions.

Energy: An agreement was completed with the Department of Energy (DOE) during 1979 that provided \$1 million to SEA-Extension. These funds are being used to carry out 10 livestock solar energy demonstrations per State in 9 States. A project is being negotiated with DOE for a similar program dealing with grain drying.

The objective of this cooperative program is to demonstrate the technical and economic feasibility of using solar energy to dry on-the-farm crops and grain. The program emphasizes the importance of using solar energy in such farm-related activities as heating livestock shelters; drying crops, especially for grain and tobacco; pumping water for irrigation; and watering livestock and crops. The program also includes assistance in developing the use of solar energy as an alternative source of heating water for home use.

Commodity Industry Programs: The Beef Commodity Industry Program, initiated in 1976, resulted in the establishment of the Beef Improvement Federation involving 45 industry organizations and the format for the Beef Improvement Federation Performance Testing Program.

Through State Extension specialists and industry representatives, a positive program was developed to improve efficiency of the beef industry. Specific projects are improvement in management and production efficiency of cow-calf operations; improvement in genetics and breeding practices; and improvements in range management, forage production, and nutritional programming.

The Extension Sheep Industry Development Program (SID) initiated in 1967 has continued to strengthen and improve the viability of the Nation's sheep industry. Specific areas to which educational efforts have been directed include:

- The Sheepman's Production Handbook. This is currently the standard resource for teaching sheep production at the university level.
- Development and distribution of the Sheep and Lamb Marketing Handbook and Fact Sheets.
- Sheep-for-Profit demonstrations in 17 States.
- Tel-O-Auctions to increase producer marketing power.
- A "Blueprint for Progress" program now being implemented in 23 States.

Through a National-Industry Pork Resource Committee, efforts are underway to improve the quality and availability of educational materials for the pork industry; help Extension workers provide more uniform information to pork producers; and intensify and strengthen programs in swine production. The programs in swine production are aimed at: (1) Developing swine production units to provide an equitable return comparable to other occupations; (2) strengthening individually owned farms; (3) strengthening the comparative advantage of the United States in world trade; and (4) improving the quality of the environment and conservation of energy through the wise use of resources.

Extension programs on soybeans have continued to help soybean and grain producers increase their understanding of farm production and marketing options. Recently-developed educational materials assist farmers in looking critically at the costs of production for soybeans versus other crops. Other educational materials continue to be used to assist soybean and grain producers in determining their marketing strategies. Many farmers are using forward pricing or delayed pricing practices. A recent Illinois study indicated that more than half the soybean and corn farmers in that State were using forward pricing or delayed pricing strategies to maintain a more workable marketing strategy for their particular farm operation.

During the past year, Extension wheat programs have educated producers in the control of wild oats and jointed goat grass. Controlling these weeds will help producers increase incomes in those States that are heavily infested with these weeds. Other educational efforts are designed to help producers deal with risk and uncertainty in managing their wheat farms. Technical assistance has been provided on wheat production costs, wheat production systems, and the economies of fertilizer use in wheat production. Extension economists have continued to develop and disseminate materials on forward pricing, hedging, use of storage and storage programs, evaluating loan and loan programs, grain pooling, quality maintenance, delayed pricing contracts, wheat-grading factors, and technical analysis of the future markets.

Direct Marketing: Participation and activities of farmers' markets have increased in most States. In Illinois, New York, Colorado, Pennsylvania, Washington, and Michigan the number of farmers' markets has increased from 45 in 1976 to 179 in 1979. As the number of markets has increased, additional farmers have had an alternate marketing choice. More consumers have been able to shop farmers' markets and are attracted by the freshness, quality, choice, and price of products.

"Pick-your-own" operations have grown rapidly as small- and medium-sized farmers have adapted to this method of marketing. In Missouri, Illinois, Indiana, and Ohio, 85 percent or more of all small fruit grown is sold on a pick-your-own basis.

In 1979, 14 States held conferences or workshops for farmers aimed at increasing their marketing skills to secure a better income and to better serve customers in their area.

Transportation: SEA-Extension is continuing its educational efforts in transportation. Educational approaches are being designed to assist agricultural and rural groups, as well as transportation firms, to understand the need for transportation plans and to help assure that adequate consideration is given agricultural and rural interests in developing State transportation plans. Currently, SEA-Extension is working with the North Carolina and Minnesota State Extension Services to develop demonstration projects that will further these efforts. Upon completion of these projects, the methodology will be made available to all State Extension Services.

Farm Safety: Forty-eight full-time and three part-time safety leader positions have been established in the State Extension Services. Forty-one States have completed or are conducting voluntary farm safety surveys in cooperation with the National Safety Council. Results of these surveys are analyzed by the National Safety Council and Extension safety leaders to determine the location of and possible causes of accidents, and to provide a basis for priority program development in accident prevention. Programs for youth, small grain, beef and dairy farmers, and small fruit producers are emphasized. Selected program examples are:

- Five States are training emergency medical teams in methods of extricating victims from agricultural machinery in case of accidents. This will result not only in better treatment but a reduction in total accidents when the causative factors are related to the training of equipment operators.
- The number of accidental deaths in Nebraska has been reduced from 70 in 1965 to 33 in 1977, a reduction of 27 percent. In 1965, 26 of the 70 deaths were the result of tractor overturns, while only 6 deaths were attributed to tractor overturns in 1977.
- In California, workmen's compensation payments to injured farm workers has been reduced by more than \$5 million annually as a result of an active farm safety program.

Antibiotic Residues: Food safety monitoring programs carried out by USDA's Food Safety and Quality Service (FSQS) disclosed a significant number of cull dairy cows with violative levels of antibiotics at slaughter. In cooperation with FSQS and Food and Drug Administration, SEA-Extension, American feed manufacturers, and industry representatives developed an educational program to help eliminate this problem. Specific programs are:

- Development of an intensive educational program for veterinarians and dairymen to acquaint them with regulatory requirements.
- Development and distribution of educational materials to State Extension personnel to support educational efforts.

Sulfa Residue Program: Work in this area consisted of an intensive cooperative program to provide technical assistance to swine producers. Extension personnel, cooperating with research and action and regulatory agencies, are conducting on-farm investigations to assist swine producers to use sulfa drugs, which will prevent drug residues in swine offered for slaughter.

A program is being conducted in 24 States to enable swine producers to use more effectively and efficiently low-level sulfonamides for disease control, growth promotion, and prevention of residues in swine offered for slaughter.

Farm Management: The financial management problems and decisions of farmers have received increasing attention in Extension educational work. The training of farmers and farm-lending personnel on how to prepare cash-flow projections and other financial statements has been increased as the capital investment required in the farm business grows steadily higher. Farmers are being assisted in dealing with risk and uncertainty in their production and marketing decisions. Extension educational programs also have been initiated on dealing with inflation, tax management, and estate and retirement planning, and in preparing revised leasing and other farm business arrangements. Computer programs are being used to assist producers in preparing cash-flow projections, making investment analyses, and other financial management decisions.

A 10-State National Advisory Committee on Farm Income Taxes meets annually with the Internal Revenue Service to revise the Farmers' Income Tax Guide. As a result, 25 States held 270 schools attended by approximately 37,000 tax practitioners, who assisted innumerable individual farmers with their tax returns.

Outlook: Thirty-two State Cooperative Extension Services are now receiving some or all of the USDA crop and livestock reports through the Computerized Outlook Information Network (COIN). Currently, there are 120 reports in COIN, with approximately 300 files (units of information). In addition, a daily national grain market summary report and USDA news releases having a bearing on outlook are entered into the system. World weather conditions have been added to the Weekly Roundup of World Production and Trade Report.

To complement the major USDA reports, Extension economists from a dozen States enter their analyses and interpretation of these reports into the system. As States develop their own computer systems, county/area Extension offices increasingly access the outlook materials. Most of the major reports are available to users within an hour on the same day they are officially released by the USDA. Plans are underway to make all or part of four ESCS data bases available to State Extension Services on an experimental basis in 1980.

Dutch Elm Disease: This program represents a cooperative effort with USDA's Forest Service, State forestry agencies, municipal governments, and other State and local organizations. Forest Service emphasizes detection and removal of diseased trees in demonstration areas. Extension Services conduct the education phases of the program. Major efforts are underway in 42 cities in 5 States (Minnesota, Wisconsin, Georgia, Colorado, and California). One or more of the following are being demonstrated in several of the areas: (1) Insecticide spraying to control the insect vector; (2) root graft treatment to prevent underground tree-to-tree spread; and (3) tree injection of a fungicide to control the disease. Many cities have wood utilization projects.

Small Farms: Approximately two-thirds of the farms in the United States are in the "small farm" category, using the following definition for families who:

- Operate a farm by providing most of the labor and management.
- Depend on farming operations for a significant, though not necessarily a majority, of their income.

- Have a family net income, from farm and nonfarm sources, that is below the median nonmetropolitan income in the State.

The Cooperative Extension Service at the county level is working with many individuals and families in this segment of farmers, which represents seven out of every ten farmers in the Nation. The nagging question that demands a better answer is "How can Extension reach and serve more of this large clientele?" Many State and County Extension staffs are finding ways to increase service to this group of farm families--often without fanfare--most often without earmarked or increased funding. Here are brief examples:

Texas--Net farm income increased an average of 48 percent for small farmers enrolled in the Texas Extension Intensified Farm Planning Program. Equally important, increases were substantial in the number of participants who also took advantage of other government and Extension programs. For example, there was a 72-percent increase in the number of farmers contacting their Extension office for information; a 136-percent increase in the number attending tours, meetings, and demonstrations; a 21-percent increase in the use of Soil Conservation Service; and a 19-percent increase in the use of the services of the Farmers Home Administration. Texas has expanded this special program to 15 counties and has produced a "Simplified Farm Equipment Handbook for Small Farm Operation."

14 Southern States--Data were collected on the total of 4,543 farmers who participated in 23 Extension small farm programs in 14 southern States in 1977-78. Twelve percent of the farmers increased sales more than \$2,000 annually since they began the program; some 65 percent of the farmers improved production practices.

As a result of the five regional small farms conferences held in 1978, most States now have a small farm committee to work with SEA-Extension and other agencies and organizations on small farm projects and problems. In addition, many States have organized county small farm committees to relate with the State small farm committee. The USDA Small Farm Working Group has initiated Small Farm Family Assistance Projects (SFAP) supported primarily by redirected funds from USDA Agencies, Community Services Administration, and ACTION, to better serve small farmers. Seventeen State projects have been selected, and others are being considered.

NATURAL RESOURCES

Current Activities: Natural Resources programs account for about 3.3 percent of Extension's professional staff time. Among the current areas of emphasis are forest management, rangeland management, fish and wildlife management, outdoor recreation, and environmental management and public policy.

Natural Resources began to function as a separate SEA-Extension unit in March 1979. The major objectives of the new unit were (1) to plan for implementing P.L. 95-306, the Renewable Resources Extension Act of 1978, and (2) to continue to provide program leadership to State Extension Services for natural resources programs.

Planning for the implementation of the Renewable Resources Extension Act of 1978 was placed under the auspices of the Joint Council on Food and Agricultural Sciences. The Joint Council appointed a committee representing broad natural resource interests to develop the 5-year national plan in Renewable Resources Extension called for in P.L. 95-306. This plan is coordinated with the Resources Planning Act and the Resources Conservation Act of the Forest Service and the Soil Conservation Service.

The planning process began with States submitting preliminary renewable resources plans. A four-member Intergovernmental Personnel Act planning team analyzed the plans. Four regional workshops were held to receive additional State inputs. The draft of the 5-year plan is being reviewed by the natural resources community and other interested parties, plus the participants in a national planning conference, with submission of the final national plan scheduled to go to Congress by March 31, 1980.

The 5-year plan is to be used as a guide by States to prepare their annual renewable resources programs, using the public and other agency involvement procedures specified in P.L. 95-306. This Act also requires annual progress reports to Congress.

Selected Examples of Recent Progress:

- - In North Carolina, Extension helped attract and locate a wood-pelletizing mill. This mill, the largest in the United States and the first in North Carolina, will convert 500 tons a day of previously unmarketable sawdust and bark into wood pellets to be used as a substitute for fossil fuels. The sale of residues will generate an income of approximately \$250,000 a year to local sawmills. Use of the pellets as a fuel will save the equivalent of 4 million gallons of oil a year and improve the State's trade balance by \$4 million annually.
- - Each year 500 to 800 forest owners, who live in Chicago but own land in surrounding States, attend Extension educational programs specifically designed for absentee landowners. Landowners learn about alternatives for their forestland and how to seek the help and assistance needed to manage it to achieve their ownership objectives. Similar courses for absentee owners are held in many other major metropolitan areas. Through this program, thousands of private forests have been placed under better management to achieve owner objectives.
- - Valuable renewable natural resources are wasted, and homeowners and others are forced to make expensive repairs because they do not know how to prevent biodegradation of wood (rot or insect damage). Louisiana Extension (in cooperation with the Forest Service and using research conducted by the Gulfport, Miss., Wood Products Insect Laboratory and Forest and Wood Product Disease Laboratory) assisted in the Statewide public information and education mass-media campaign to create awareness of such deterioration. Louisianans were informed on procedures available to reduce this needless drain on forest resources and the preventable expense of making repairs, which would not have been needed if good building practices had been followed or if corrective action had been taken before the damage became serious.
- - In 1980, the most promising aspects of the program in Louisiana will be extended to North Carolina, Florida, and Texas. The publications produced as a result of the earlier campaign are available throughout the Nation.
- - North Carolina Extension sponsored "Wood in Home Construction" workshops, which attracted over 500 builders, building material suppliers, and homeowners interested in learning more about specification of wood products and cost-saving building techniques. Use of the methods described would cut the cost of an average home by up to \$500. A major construction company estimated that the information provided on specification of particleboard and plywood will enable them to save more than \$200,000 a year by reducing the amount of material that they have to reject or replace.

- - Extension wood products specialists in the South have organized a Southern Regional Kiln Drying Instruction Course that moves from State to State. In the past 3 years, 300 dry kiln operators have received intensive training enabling them to dry lumber more effectively with less damage to the lumber plus using energy-saving drying techniques. One of wood's advantages is that it is low-energy consumptive. The energy used in drying is the largest amount used in producing wood products. This "rotating kiln drying" training course makes the training available locally. Involvement by Extension specialists from various States assures that course content will incorporate the latest technological progress in lumber drying. Technology can reduce energy consumed in drying lumber from 15 to 50 percent and still maintain or improve quality.
- - Timber price information is now available for the first time to the average North Carolina citizen. North Carolina Extension has added timber price information to Extension Teletip, the organization's Statewide toll-free answering service. Any resident of the State can call the Teletip number (1-800-662-7301) and find out current timber prices. Landowners sell timber infrequently, and they have no good way of keeping up with its price. Timber is sold in many ways, prices fluctuate widely from region to region, and daily market quotes are not available. The information on Teletip will help a landowner to determine a fair price for timber. Timber price information is recorded and updated monthly. Nine different recorded messages are available. All deal with standing timber prices. Each message gives a price range and average price for a particular type of timber. It also gives price trend information and indicates the strength of the market.
- - In Texas, an intensive result demonstration program has been initiated on the efficient use of farm ponds for food and recreation by marginal income families. This program was implemented by Texas Extension and coordinated with Prairie View A&M University. The 69 intensive result demonstrations are designed to show marginal farmers how to increase the harvestable yield of fish almost 10-fold over unmanaged conditions. Estimated management costs are approximately \$.45 per pound. Yields for unmanaged ponds range from 35 to 100 pounds per acre of harvestable fish while managed ponds can produce 300 to 1,000 pounds of harvestable fish per acre.

HOME ECONOMICS

Current Activities: Approximately 22.8 percent of Extension's professional staff time is expended on home economics extension programs. Nearly 4,000 home economists, assisted by approximately 600,000 volunteers, conduct these programs to help families identify their needs, make improved decisions, and use and conserve their resources to achieve a desired level of living. Extension educators helped nearly 30 million families deal with inflation, energy, nutrition, and family-related problems. (This figure represents direct contacts and does not include the millions of mass-media contacts.) Target audiences for these educational programs include young families, low-income families, the elderly, the handicapped, minorities, Extension homemakers, youth, and leaders who extend Extension's educational program to others. Extension educators use methods such as mass media, group meetings, personal contacts, shopping mall programs, correspondence courses, computer-assisted programs, exhibits, and newsletters.

Family Education: Family Education programs have addressed major problems facing families: energy costs and conservation, impacts of inflation on the family economy, lifestyle changes affecting individuals and families, and maintenance of health and safety within the home. Extension educational assistance in any specific subject matter area usually covers one or more of the priority concerns. Program delivery has adjusted to constantly increasing numbers of women in the work force. Altered time and formats of program offerings make available indepth and point-of-purchase assistance to users of Extension family education. Increased interest in self-help and self-sufficiency by families is reflected in programs which provide information, education and related skills needed to improve or implement recommended practices.

There are increasing demands on Extension staff to provide help on a broad range of consumer problems. A substantial number of requests come from urban areas and other agencies and organizations who rely on Extension's field staff of professionals.

Selected Examples of Recent Progress:

ENERGY: All program areas have incorporated energy implications into their programs. Extension educators teach families how to make appropriate adjustments for a less energy-intensive lifestyle. Adapting housing to reduce energy requirements for comfort will continue to be a need in every State. The potential for energy conservation in the residential sector is great since families represent the greatest number of users of energy as well as the future energy decisionmakers. (Two-thirds of all energy used is by these consumers.)

Massachusetts: Energy audits, conducted by Extension-trained and supervised CETA workers going door-to-door, have been successful. In the first year of this program, 70 CETA workers were trained and performed 3,514 home energy audits. At the end of the first year, a survey was taken of half of the participants to determine how they responded to the energy audit. On the basis of this survey, it is estimated that home owners spent \$831,000 on energy-conserving home improvements and that these improvements save about \$327,000 worth of fuel per year at current fuel prices.

Mississippi: Energy conservation workshops in 11 counties reached 1,500 women, and 75 reported they had weatherized their homes and reduced utility bills by 35 percent. A total of 165 meetings on energy conservation were held to reach low-income, elderly, students, homemakers, and general public. An exhibit on energy conservation at the Statewide Home Builders Show reached 5,000. A display at the Delta Expo reached 6,000. A Statewide energy cost-cutting project was launched through the homemaker organization in cooperation with the Electric Power Association, and a contest for energy-conserving demonstration home was initiated. The Mississippi staff trained other professionals who were multipliers of information.

New York: Through a mass-media approach, 3 1/2 million energy fact sheets were distributed, 35,000 copies of Save Energy/Save Dollars manuals were sold, 18,000 airings of energy radio tapes reached 18,000,000, a 5 part series on prime TV time reached 27,500,000, and 72 energy newspaper supplements reached into half the homes of the State. Energy exhibits were seen by an estimated 500,000 people.

Housing: This program helped families learn to weatherize their homes to reduce energy consumption. Programs were designed to teach the skills of home repair and retrofitting maintenance. These programs were especially helpful for low- and moderate-income consumers. Adapting housing to use passive and active solar heating has become more competitive, cost-wise, in heating or supplementing home heating. Extension programs have helped families evaluate their housing in terms of needs and affordable space. They have learned how to furnish and to extend the life of furnishings and household equipment.

Arizona: Preoccupancy and postoccupancy training programs were held for 45 new homeowners on an Indian reservation. These programs included caring for the home interior, appliances, and fixtures, and maintaining mechanical systems. Financial management implications were a part of each session. Home visits resulted in positive evaluation with estimates of \$20,000 saved by persons attending these training programs.

Arkansas: Nearly half the counties held programs on home furnishings featuring window treatments, energy conservation, use and care of home furnishings. Upholstery workshops saved families who attended more than \$40,000. Families reached with information on selection and use of household equipment saved almost \$20,000 by learning how to save energy. Educational assistance in planning new housing saved families more than \$72,750. Fourteen counties reported 116 plans were developed for result demonstrations.

FAMILY RESOURCE MANAGEMENT: This program is designed to help people control spending, change spending patterns, determine debt limits and reduce indebtedness, review and change insurance policies and wills, plan descent of real and personal property, plan retirement, and learn more about such vital matters as the economic aspects of birth, education, death, housing, transportation, and medical care.

Texas: A total of 100,432 in 130 counties attended programs in management skills, money management, and consumer skills. Results include:

- 1,094 families in five counties used the computer program to analyze and adjust spending.
- 66,779 developed budgeting skills
- 14,586 improved buymanship skills
- 1,964 low-income families learned to manage savings and avoid loss through fraud.
- 1,500 low-income families in nine counties participated in 134 workshops on money management and credit.

Arkansas: Family resource management programs in 36 counties reached 24,625 families. A total of 500 attended estate planning workshops in 12 counties. In one county 15 aides worked with 493 families to improve their household management at an estimated savings of \$45,133.

Connecticut: Over 300 professionals preregistered for a consumer issues course that Extension offered on television. These people then helped 30,000 families with priority consumer problems. A consumer news column in a daily paper reached 300,000 people weekly and responded to about 800 questions from readers monthly.

New Mexico: Over the last 4 years, 4,400 participated in a consumer program. "How to Save \$20 in 20 Minutes." Participants reported savings of \$264,000 as a result of adjusting their buying practices. Some 636 Spanish-speaking residents located in 28 communities in 10 counties participated in a program on door-to-door buying from salespeople. Ninety percent reported they had previously been unaware of their right to cancel such purchases within 3 days.

TEXTILES AND CLOTHING: This program helps families plan and acquire satisfactory clothing with less money. These programs teach families to improve buying skills, increase their ability to make and/or renovate clothing, and improve their understanding of textile-related issues such as product labeling, flammable fabrics, metric conversion, phosphate detergent ban, and water temperature recommendations for energy conservation.

Florida: A total of 28,242 people were given information on clothing. Some of the topics covered in programs were basic clothing construction, how to sew, how to care for the sewing machine, sewing for children, fitting and altering garments, and tailoring. Special attempts were made to reach the low-income and hard-to-reach by providing monthly demonstrations at a Food Stamp Center. Consumers were taught how to select and care for clothing to prolong its useful life. Stain removal charts were distributed at automatic laundry facilities.

Arkansas: Furniture refinishing, painting, and reupholstery and clothing workshops help families use resources more effectively. One county reported 262 pieces of furniture upholstered with a savings of around \$12,000; 687 garments recycled with savings of around \$2,000; 3,228 new garments made with savings of \$30,000; 94 pieces of furniture refinished with a saving of \$2,000 and 235 families made home improvements with an estimated savings of \$45,000. Six counties (436 families) reported the value of garden food preservation to be over \$86,000.

HEALTH: This program helped families and individuals focus on health promotion-- changing or modifying individual attitudes and behavior so that improved quality of life is realized. Disease prevention was emphasized to increase awareness and skills in recognizing signs and symptoms of disease and seeking timely treatment. In addition, Extension educators were concerned with environmental factors and community facilities that may be modified, controlled or extended.

Missouri: Families living on small farms, not participating in Extension programs, were contacted and taught how to use available resources to improve their quality of living. "Education Assistants" (paraprofessionals) worked one-to-one with 35 to 50 individual families, stressing transfer of agricultural production technology, family resource management, and home gardening. Missouri's 1862 and 1890 institutions were involved in the Small Farm Family Program, which has increased to 49 education assistants in 33 counties working with over 2,000 small farm families. A research study shows the benefit-cost ratio of this program was 3.5 to 1, and only 25 percent of the participants are full-time farmers. Tangible results include: 184 families added 6.6 sows in 1977 to increase gross income by \$3,600 per farm; 1,835 families produced and preserved 131,113 quarts of food worth \$52,445 plus improved nutritional value; and 489 families used home weatherization practices.

FOOD AND NUTRITION: SEA-Extension staff professionals direct approximately 10 percent of total staff hours to food and nutrition activities. Programming in Food and Nutrition is geared to families and individuals from all cultural, racial, and socio-economic backgrounds to help them: evaluate food choices; determine adequate meal plans; and manage whatever money and energy resources are available to procure and prepare the foods they choose.

Improving health by selecting foods wisely has been a major part of SEA-Extension's Food and Nutrition program during the past year. In many areas of the country, the local Extension office is the only source helping persons interpret information related to nutrition and the only source providing recent, research-based information that is requisite to forming sensible, daily decisions on how to eat adequately but not excessively to maintain good health.

Every State includes food safety as a component of its Food and Nutrition programs. Food safety is included in all food preservation programs. Extension staff emphasize in their programming the prevention of foodborne illness and they deliver that message through television and radio programs, newsletters, newspaper columns, and news features.

Every State Extension Food and Nutrition program uses in-service training for its professionals. All States use volunteers to expand the work of professionals.

Many States carry on pilot projects to determine the most effective method for teaching and informing people whether the information exchange be through the media or carefully planned group meetings. To teach and inform about established program topics, Extension educators use a variety of methods that include mass media, group meetings, personal contacts, shopping mall and grocery store displays, correspondence courses, computer-assisted programs, exhibits, and newsletters.

Selected Examples of Recent Progress:

Massachusetts: The Extension Service is working on educational materials that incorporate nutritional guidelines into the daily diet and that stress vegetables, legumes, and grains. Extension has sponsored two well-attended all-day meetings on nutritional guidelines and has done radio and television spots to accompany its printed materials on vegetables. Public health works closely with Extension on these projects.

Illinois: One of the State Food and Nutrition specialists teaches at open meetings for various audiences on such topics as diet and heart disease, nutrition facts and fallacies, and information about fiber.

For young homemaker groups, the specialist speaks on nutrition through pregnancy and nutrition from infancy through preschool age. Current research findings on the relationships between sugar, food additives and hyperactivity is another popular topic with these homemaker groups.

Michigan: Michigan Extension Food and Nutrition staff have a pilot-tested Master Canner Program in which elderly men formed part of the audience. Each person enrolled in the program was expected to volunteer 10 hours of time to Extension for disseminating food preservation information (handing out fact sheets, giving demonstrations, etc.). Master Canner Program lessons are three hours in duration and give the learner a hands-on experience with actual handling of pressure canners and other food preservation equipment. Lesson plans include: canning acid foods, canning low-acid foods, pickling, freezing, and drying.

Montana: A five-year plan to help Extension clientele meet economic crisis is being developed. The program "Making Ends Meet" will be aimed particularly at the young homemaker. Extension Food and Nutrition staff will train county agents in the areas of meal planning, low-cost foods, and meal preparation skills, shopping and safe food preservation, preserving and storing garden vegetables.

Idaho: A Food and Nutrition Certified Volunteer Leader program is growing throughout the State. (Interested volunteers receive 30 hours of special training from an area Food and Nutrition agent before they are certified to teach. This training qualifies them for Food and Nutrition work within their communities.) Certified Leaders serve as resource persons to 4-H leaders, low-income families, and organized groups. Work done with families is on a one-to-one basis.

California: About 74 percent of the several thousand radio stations in the state air the Food and Nutrition information spots that California Extension Food and Nutrition specialists help produce. A statewide newsletter reaches 64,000 people and includes information of food buying, food preservation, and nutrition. Five counties prepare newsletters in large type targeted to the elderly. In 1978, California Extension made 1,064,071 contacts with food and nutrition information -- 21 percent of Extension's total contacts for the year. Printed leaflets as well as public service announcements are prepared in both English and Spanish for targeted subjects.

ADULT EFNEP: The Expanded Food and Nutrition Education Program (EFNEP), implemented by the USDA and the State Cooperative Extension Services in 1968, has made it possible to expand food and nutrition education to low-income families. The paraprofessional program aide, supervised by Extension home economists, teaches families who respond to one-to-one and small group meetings.

More than 1.7 million low-income families, representing 7½ million family members, have been enrolled in this indepth food and nutrition education program since 1969. Enrolling homemakers with young children is emphasized in the program. Currently, 5,215 program aides trained by home economists are employed to reach families in about 1,200 program sites. Families are taught to improve their diets through increased knowledge and improved practices of nutrition. EFNEP increases the ability to select and buy food, prepare and serve balanced meals, manage resources of these families including gardens and food stamps, and improve practices in food preservation, storage, and sanitation.

EFNEP participants are families with limited financial resources and educational attainment. Last year, (September 1978) about 70 percent of the families received an annual income of less than \$5,000. Approximately 35 percent of EFNEP homemakers were reported as having an eighth grade education or less. Sixty percent of the participating families were minorities.

EFNEP data provide evidence that EFNEP contributes to improving diets of low-income families. This is measured by the change reported in family diets during enrollment. The food consumption data are collected through 24-hour food recalls requested of the program homemakers by the paraprofessional aides. Homemakers are asked to tell what they ate during the preceding 24 hours. The servings from basic food groups (milk and cheese, meat/poultry/fish and beans, fruits and vegetables, and bread and cereals) is used to judge the adequacy of diets.

In September 1978, the percentage of program family homemakers reporting at least one serving from each food group increased from 51 percent when they entered the program to 74 percent after 18 months. The percentage of program family homemakers reporting consumption of an "adequate diet" as measured by the requisite number of servings from the basic food groups increased from 5.3 percent when they entered the program to 14.6 percent after 18 months in the program.

The Food and Agriculture Act of 1977, Section 11(f), Title 13, included the following statement: "To encourage the purchase of nutritious foods, the Secretary shall extend EFNEP to the greatest extent possible to reach food stamp program participants." In compliance with the Food and Agriculture Act, States' progress reports and plans of work reflect frequent contact with food stamp certification officers and mutual referral where possible; materials explaining EFNEP are made available to food stamp officers, and food stamp personnel are involved in EFNEP training sessions.

Selected Examples of Recent Progress:

Connecticut: Spanish-speaking EFNEP families have special problems adjusting to living in urban areas. Special effort has been made to provide them with illustrated easy-to-read food and nutrition educational material printed in Spanish. These food and nutrition materials have also been used by other staff to reach Spanish-speaking groups through Spanish community centers, drop-in centers, institutes, mothers' groups, churches, bilingual schools, adult learning centers, and low-income housing centers.

Iowa: Indications of program's success as reported by aides:

"Just lately one homemaker complained about the amount of milk her kids were drinking this summer and that she couldn't afford it. So I did the dry milk lesson. She bought some and tried it and has continued to use dry milk."

"Fruit and vegetables are the very last thing that my homemakers buy at the store if money is short. They buy meat and bread. So I helped my families with gardens. Of my 24 families enrolled now, 10 have gardens, which helped with their food recalls on the fruit-vegetable groups."

Minnesota: The economic changes include: savings due to less medical and health education costs; savings from economical use of food dollars; savings from family members' increased income due to improved working status of youth and/or adults. The social changes for families include: improved health of family members; improved family financial well being and reallocation of resources; increased self esteem and personal satisfaction of family members participating in EFNEP activities. These changes lead to greater participation in educational, vocational, and social activities.

4-H EFNEP: About 650,000 youth are currently participating in Extension's 4-H Expanded Food and Nutrition Education Program, primarily for low-income city youth. About half of these youth come from minority, ethnic groups.

As a result of this program, youth are learning good nutrition practices, how to improve their diets, and how best to utilize the food available to them. In addition to improved health, involvement in this program contributes to the personal development of disadvantaged youth.

Last year, about 45,000 volunteer leaders, many of them from low-income, minority groups, worked with 4-H EFNEP.

Selected Examples of Recent Progress:

- In Puerto Rico, 13,525 youth are enrolled in 4-H EFNEP, with the following results: 680 youth established vegetable gardens in order to improve their family diets, 8,755 youth acquired knowledge on meal planning and food preparation, 2,061 youth acquired knowledge on food selection and buying, and 2,100 youth improved their dietary level.
- In Oxford County, Maine, nutrition day camps were held in 24 locations with 732 children and 52 volunteers participating. Goals included understanding and using the basic four, improving dental health and decreasing snacks and cereals high in sugar, understanding nutrients and the digestive system.

In Waldo County, Maine, an educational program for improving the dietary habits of young mothers (13 to 17 years of age) was conducted, involving 90 girls. Many of them were from low-income families.

4-H YOUTH DEVELOPMENT

Current Activities: The primary objective of 4-H youth development programs is to provide -- through practical learning experiences -- knowledge and skills that will help youth of all socio-economic backgrounds, wherever they live, develop individually and as responsible and productive citizens.

4-H programs are operated through a unique partnership involving youth, volunteer leaders, State land-grant universities, Federal-State-local governments, and the private sector. Parent involvement in 4-H is important to its success.

Last year, approximately 28 percent of Extension's professional staff time was devoted to 4-H youth programs.

In all States, current emphases in 4-H youth programs center on the following areas:

- Career exploration, youth employment, economic understanding,
- Improving the environment and conserving natural resources,
- Food and fiber production, processing, marketing, and consumption,
- Nutrition,
- Conservation and wise use of energy resources,
- Preparing youth for family responsibilities,
- Health and safety,
- Consumer decisions and responsibilities,
- Community development, leadership and citizenship activities,
- Leisure education,
- International education.

Special efforts are being made to double the numbers of 4-H volunteers who are essential to any 4-H expansion efforts and to reach larger numbers of youth, including the handicapped, from all socio-economic, cultural, and ethnic groups --both rural and urban.

Since 1970, participation in 4-H has doubled. Farm and rural youth enrollments have increased by 33 percent, urban youth participation has tripled, and minority youth involvement has increased from 18 percent to 24 percent in 1978.

A total of 5,234,342 youth took part in 4-H programs in 1978, compared with 5,453,956 in 1977. This slight decrease came primarily in 4-H TV and in 4-H EFNEP. Comparisons:

	<u>1977</u>	<u>1978</u>
In organized 4-H Clubs	2,178,216	2,090,798
In special interest groups	1,894,428	2,070,161
In 4-H EFNEP	845,587	641,163
In 4-H TV	535,725	432,220

By place of residence, 4-H youth participation in towns under 10,000 and open country, as well as in cities of over 50,000 and their suburbs, showed significant gains (includes membership in 4-H Clubs and 4-H special interest units):

	<u>1977</u>	<u>1978</u>
From farms	879,025	851,501
Towns under 10,000 and open country	1,632,141	1,665,219
Towns and cities 10,000 to 50,000	693,181	680,660
Suburbs of cities over 50,000	363,074	401,586
Central cities over 50,000	505,223	561,993

Youth in 4-H Clubs and 4-H special interest units enrolled in 8,811,154 4-H educational projects in 1978 -- an average of 2.1 projects per member. Compared with 1977, the projects are as follows:

	<u>1977</u>	<u>1978</u>
Animals and Poultry	1,401,520	1,431,038
Plant Science and Crops	669,519	625,864
Energy, Machines, and Equipment	1,004,036	1,048,673
Ecology, Natural Resources	778,005	735,207
Economics, Jobs and Careers	143,780	150,418
Community Development, Service Government	783,750	746,794
Leisure Education and Cultural Arts	947,508	1,019,684
Cultural Understanding and Exchanges	89,604	90,136
Health, Personal Development, Relationships	626,471	653,279
Individual and Family Resources*	1,649,452	1,608,444
Communications Arts and Sciences	395,040	422,576
Introductory, General, Miscellaneous	284,508	279,041

* Does not include participation in 4-H EFNEP

4-H volunteer leadership increased in 1978 over 1977. In 1978, 579,624 volunteers assisted 4-H youth in their programs and activities, compared with 578,500 in 1977. Not included in these totals is a substantial involvement of resource people, business, industry, agricultural, and civic groups who support 4-H in their local communities. For every hour spent by a professional Extension worker on 4-H, volunteers spend 10 hours. In 1978, volunteer staff time in 4-H was valued at over \$600 million.

Selected Examples of Recent Progress:

- The Ready Power Energy Awareness project developed by junior 4-H leaders in a 9-county area in Ohio reached over 12,000 youth during its two-year operation. Many of the children indicated they would use their new awareness to cut back on energy waste at home. In addition, the 4-H junior leaders involved in the teaching teams received valuable leadership development and public speaking experience.

- New Mexico, selected to conduct a pilot 4-H educational program in energy conservation, included such activities as a camp to train teens in home weatherization. Three teens from each county received special training and in turn conducted a home weatherization program for the 99 campers. In addition, each teen was committed to conduct 2 home weatherization programs in his or her respective communities. Other activities included a special "Energy Day with 4-H" at the New Mexico State Fair, 4-H energy conservation exhibits viewed by 10,000 people, and energy workshops.
- More than 130 Wayne County, Michigan, youth participated in a 4-H Employable Skills program last year, designed to help youth gain necessary skills to find and maintain a job. After completing their job skills training, these youth were required to put their new knowledge into practice in their communities. As a result of their efforts, similar programs were organized at six sites in Wayne County, involving 359 youth. Thirty-nine volunteer youth, all graduates of Employable Skills Program, assisted in conducting the summer programs. The youth volunteers taught other youth job-related skills and also helped organize various 4-H arts and crafts, recreation, and foods-nutrition activity groups at the community centers. As a result of the program, some youth obtained employment in local department stores and restaurants. Others became youth aide trainees as a part of the CETA program.
- A survey of Wisconsin 4-H Clubs showed that 95 percent of all clubs carry out a community development project each year, such as clearing river banks and roadways, fixing old school houses and town halls, sponsoring community health and safety projects, helping the elderly in their homes or at local nursing homes, and others. Wisconsin staff estimate that if each of the 4-H'ers spent only 2 hours at community development each year and was paid the minor's minimum wage of \$2.20 per hour, they would contribute nearly \$250,000 worth of work to help their communities.
- In a 3-month pilot demonstration, "Project H.O.M.E." in Ohio, under 4-H leadership, teens were trained to improve the safety of 115 elderly persons' homes. The project met another need at the same time--the high unemployment rate among teenagers--by recruiting and training teenagers to do home repairs for the elderly in four pilot counties. Retired persons with home improvement skills were hired to train the teens. After the pilot demonstration was completed, one county council continued the program, making 270 repairs to elderly people's homes over a 12-month period.
- In Alabama, 175 4-H'ers shared their nutrition knowledge with the elderly at nutrition feeding sites. In addition, 215 4-H'ers visited the elderly in nursing homes and assisted the elderly living alone with grocery shopping and food preparation.
- 400 children in northeastern Connecticut participated in a traveling nutrition education project in Windham County. Low-income children were reached by teen leaders at 22 playground sites. Sixteen mentally retarded youth at an agency camp also participated. A post-test indicated increased preference for milk and understanding of some of the sources of vitamins A and K, as well as calcium.
- A 4-H urban program in the inner city areas of Charleston and Huntington, West Virginia, involves over 1,350 low-income youth in a career-oriented program. Inner city Black youth enrolled in the 4-H urban program have been involved in actual on-farm experiences. This program is going statewide this year.

- Louisiana estimates that over 1,000 gardens were grown by 4-H youth last year. At one school 20 handicapped 4-H members raised tomatoes. In another parish, 32 members raised gardens that saved about \$1,500.
- In Cass County, Iowa, 7 of the 4-H members involved in garden projects marketed their produce for a total of \$500. Prior to selling their produce, they were given instructions on how to select and prepare their produce for market.
- An extensive education program is being developed in California, reaching more than 6,000 migrant youth in the 4-H program. A gardening program at the migrant labor camp in San Joaquin County has attracted 300 youth participants. Nutrition education was taught to over 3,000 youth at day camps for migrant youth in California.
- Enrollment in Kentucky's 4-H Consumer Education programs has doubled over the past two years. New resources have been developed for use with this program. Forty-four Rockcastle 4-H youth received information on how to live on less while inflation requires more money to purchase goods and services. 4-H members participated in a discussion on how change and inflation affect them.
- A number of New Jersey counties are working with retarded groups. In Passaic County, for example, a group of retarded, handicapped adults carry out 4-H projects in woodworking, gardening, and arts and crafts. In Somerset County, a program has been developed for 250 handicapped youth through special education classes. Youth meet weekly with teachers serving as leaders. 4-H projects utilized included horticulture, woodworking, simple clothing, food and nutrition, and arts and crafts.
- All the youth at the Imperial County, California youth facility who have committed serious crimes are enrolled in 4-H projects. Lamb feeding projects have been most popular. Youth learn budgeting by obtaining their own loans at the bank to purchase their animals, feed and other materials. After an auction, youth pay off their loans and keep any profit.
- Over 5,000 youth were enrolled in 4-H livestock production projects last year in West Virginia. Major livestock production efforts centered on beef feeder calf and dairy heifer replacement programs. Approximately 1,000 beef feeder calves were sold by 4-H members with estimated gross income around \$300,000. The dairy heifer replacement programs continue to grow. During 1978, 62 animals averaged just over \$1,000 at sale time. This heifer replacement program makes up about 80 percent of the participants in West Virginia's 4-H dairy program.
- Since 1971, over 100,000 youth have completed a 24-hour training course in tractor and machinery safety, in connection with the U.S. Department of Labor Hazardous Jobs Order protecting youth, and have been certified to operate tractors and machinery for hire. Many small farm operators and commercial farmers depend on these teenagers during planting and harvesting seasons.
- 14,600 youth participated in various components of the urban garden program in all 5 boroughs in New York City. While food production and the learning experiences associated with it were important, more important was the development of concern for the community garden site.

- Over 10,000 youth in 4-H programs in New York State, in cooperation with local fire departments, learned about types of fires, appropriate fire extinguishing methods, home escape plans, and learned to identify and correct home and farm hazards. Several incidents have been reported in which families safely evacuated a burning building by following a home escape plan developed through this program.
- As a result of Southern University's programs for youth, 152 youth in 7 parishes were assisted in securing loans through the State Livestock Loan Program, local banks, and FmHA for purchase of animals for livestock projects. A total of 130 youth grew quality livestock and exhibited them at the State Livestock and Poultry Show at Southern University. In addition, 83 local leaders and parents of disadvantaged youth were recruited in 21 parishes to assist youth with project work; 312 youth attended demonstrations and workshops on clothing, good grooming, safety, food preservation, and leadership; 489 youth participated in summer camping programs focused on recreational activities and classes in crafts, safety, family life, and organizational leadership, and 258 older youth in four parishes participated in special programs on drug abuse and venereal diseases.
- A pilot weekend summer camping experience on the Delaware 1890 campus provided an opportunity for 160 youth from various cultural backgrounds to experience camping at a minimum fee. Overall purpose of the camp was to allow youth a chance to join in fellowship, educational, and recreational activities. By sponsoring the weekend camp on a college campus with college students as counselors and volunteers, it was felt youth would be inspired to continue their education. The camp will continue to address the importance of preparing for a career as a means of improving quality of life.
- In Chicot County, Arkansas, a special youth vegetable-growing project was conducted as a result of 1890 programs, called "Lend a Lot to Employ a Youth." The city and owners agreed to lend over 40 vacant city lots to the youth at no cost. Extension specialists trained and supervised the youth. A market was available for vegetables not used by families.

COMMUNITY AND RURAL DEVELOPMENT

Current Activities: The major goals of SEA-Extension's Community Development (CRD) program efforts are to improve rural income levels and employment opportunities, improve the access of rural residents to essential community services and facilities, and strengthen the community's ability to define and solve its problems. In carrying out its CRD responsibilities and objectives, about 30 percent of Extension's educational program is devoted to client understanding of the dynamics of community and rural development. The elements of this component include such specifics as group action and decision processes, problem identification and analysis, leadership roles and skills, problem-solving techniques, action strategies, and methods of evaluating alternatives and consequences. The nature of problems identified by the community determines the balance of the educational program. About 20 percent of CRD staff time is spent with community services and facilities; 20 percent with economic and manpower development; 15 percent with comprehensive community planning; 10 percent with environment and natural resources; and approximately 5 percent with strengthening local government operations and finance.

Of the total number of clients involved in local CRD programs, approximately 16 percent are representatives of local government (county, municipal, special districts); 12 percent are representatives of State agencies; 9 percent are representatives of Federal agencies at the regional or local level; and 12 percent represent local service clubs or locally organized development organizations (sometimes organized specifically for the project at hand). The other 51 percent are individuals who have an interest in the project or program.

Approximately a third of the projects recently studied were designed specifically to serve clients classified as geographically, socially, or economically isolated from the mainstream of American life. The term "isolated" applies to racial or ethnic minorities, handicapped, aged, youth, low-income people of any race or ethnic background, and others located in small out-of-the-way places. A random survey of 1,200 local project participants indicated that some "isolated" clients share in the positive consequences of all CRD projects undertaken, especially youth, small-farm operators, senior citizens, and low-income persons.

Selected Examples of Recent Progress:

Economic and Manpower Development: Inflation, symptoms of recession, unemployment, and diminishing investment returns have all been an impetus for increased emphasis on economic development programs. Extension, in every State, has designed programs to help communities improve and sustain their economic bases to achieve economic and social goals of their citizens--particularly those out of the mainstream. The objectives are to develop the manpower resources and create jobs that will increase personal incomes of workers and the tax base of the community. Extension professionals conduct comprehensive surveys, feasibility studies, and economic development training for lay leaders, local officials and development groups seeking to enhance economic opportunity in their communities.

The Colorado Extension "Rent-a-Kid" program combines a training program with a youth job placement program. This program provides employment for Adams County young people aged 12 to 18, regardless of income. The job focus is sporadic employment offered by homeowners, businesses, and other interested groups. Educational and training programs are held for young people registered in babysitting, lawn care, mower safety, and other special skills. The first 8 months of the program resulted in 657 youths placed in short-term, one-time or repeat jobs; 295 youths placed in full-time jobs; and 182 employers registered.

In Dorchester County, Maryland, a Title V rural development program operated by Maryland's 1890 institution is looking for new ways to provide citizens year-round vs. seasonal employment. Some degree of success has been realized through the expansion of local industries.

Extension provided assistance to industrial development groups in 46 Kentucky counties. This assistance was significant in the location of 105 new industries employing 2,100 people, with 4,200 more new jobs projected for the future. Nineteen industrial expansions were announced, at least partially the result of Extension efforts which will mean 700 more new jobs.

Community Services and Facilities: Communities are faced with the problem of satisfying citizen demands for increased levels of public services and facilities and matching these demands with growing taxpayer resistance to increasing costs and expanding public programs. Extension is helping local governments and community groups seek ways of resolving this dilemma. Studies and surveys are being conducted, methods of public and private financing are being explored; service district organizations are being formed; linkages with Federal, State and local support resources are being made; and cost reduction alternatives are being studied.

Residents of a suburban St. Louis community were frustrated with their attempts to surface a road until they "discovered" the Extension area community development specialist. This specialist helped form a community betterment group and urged people to forget about "going for a government grant." Self-assessment and a host of fund-raising events resulted in financing for a new gravel road.

In another community in that same Missouri area, a lay citizen's study credited the rapid development, funding, and operation of a new water district to the educational and organizational assistance provided by the community development specialist. This study calculates the total economic impact of the public water supply district at more than \$16 million.

Oklahoma Extension has been a leader in helping rural people make decisions about fire protection and emergency medical services. In a small community in Rogers County, an Extension "fire service awareness" program helped bring about a vote on forming a fire district, which was overwhelmingly approved. Following a feasibility study and an educational program in Pontotoc County, a countywide bond issue to establish an emergency medical district failed. Bond issue failure is no criteria for the effectiveness of an Extension program, however. On the contrary, it is an excellent example of Extension furnishing unbiased and accurate information upon which citizens may make informed decisions that best satisfy their needs and desires.

Extension outreach workers from Prairie View College and Texas A&M University are working in three counties to help citizens improve their communities on a neighborhood basis. In one year, 30 general neighborhood organization meetings were held, 70 training meetings were conducted for neighborhood officers and committee chairmen, and 1,200 individual contacts were made. As a result, 18 neighborhood improvement clubs have been organized, and citizens are planning and implementing projects designed to improve economic, health, housing, and general living conditions. Basic to these improvements is the development of leadership capable of determining priority needs and an appropriate course of community action. Extension is providing the motivation and technical assistance to accomplish this objective.

Housing: In the Courtland Community, Lawrence County, Alabama, an educational meeting on home loans and grants was held with the help of FmHA. Community Action provided a meeting place and transportation for senior citizens; 10 people subsequently filed applications for FmHA funding which were all approved.

Since construction and remodeling have started, more senior citizens have expressed interest in improving their homes. Plans also have been made to work with younger families in securing land and building new homes in Courtland.

Once called "house trailers," mobile homes have evolved into completely modern manufactured units capable of serving the needs of the average American family. Mobile homes now account for 95 percent of all single-family units selling for under \$20,000. To improve knowledge about mobile home siting and economic and social factors, North Carolina Extension received special funding from SEA-

Extension. Educational materials flowing from the project focus on selecting and developing lots, developing parks or subdivisions, and comparing ownership costs of mobile and conventional homes.

Comprehensive Planning: The ever-increasing requirement that investment of public monies in services and facilities be based upon a specialized functional plan has prompted many communities to develop a comprehensive program that can be used for multiple purposes. This program involves determining short- and long-range goals, creating community acceptance and support; involving local citizens in the planning process; and increasing citizen understanding of subsequent regulations, enforcement measures, codes, and zoning.

Currituck County, North Carolina, population about 7,000, is bounded by fragile coastal land. The county Extension chairman says that Currituck began to experience overflow growth from the neighboring Norfolk-Portsmouth, Virginia, metropolitan area. Mobile homes were being put on land with no waste disposal facilities available and, sometimes, without water. Available land was being bought or rented by potential new residents. Developers were bulldozing coastal area sand dunes and destroying delicate vegetation. The county commissioners asked the agent to work out a way with the planning board to promote orderly growth. The county declared a moratorium on growth for 18 months. The "Currituck Plan," developed subsequently, has been a good blueprint for development, and has been used as a model by other coastal counties in the State.

With the help of the town planner and an Extension community development specialist, the town of Safford, Arizona, carried out a successful planning program. First, an open citizen forum was held. The residents were then surveyed to determine their opinions on community issues. In phase three, citizen action committees were formed to develop policies on priority issues. Streets were the top concern. The city developed a street improvement program on the "installment plan." A \$1.5 million funding package was approved by a 3 to 1 vote margin. The city council credited the survey for the successful bond vote.

Local Government Operation: Extension is helping local governments become more viable and cope with the many problems they face. The content of the program includes such specifics as tax sources, equity and methods; regulatory and compliance functions; budgets and planning; matching service demands and resources; and structures and functions of public management and administration. Backed by specialized university expertise, the Extension agent provides leadership and organizational and technical knowhow that enables the local government to better respond to citizen needs.

The Director of Mississippi Extension says that "In the past, very little assistance was available to help local government officials develop their leadership and decisionmaking capabilities. Sensing a need for such assistance, Extension established the Center for Governmental Technology. The Center emphasizes training programs and dissemination of research findings to local government officials." During fiscal year 1979, a certification training program was conducted for 164 municipal clerks and 45 tax assessors. County records management training was provided for 95 chancery clerks and their office personnel. A seminar on general revenue sharing and antirecession funds was conducted for 120 county officials; a conference of assessors and collectors had 62 participants; staff training conferences were held for 93 corrections officials; a road maintenance workshop was held for county maintenance supervisors.

The Governor of Georgia proclaimed a Local Government Week to encourage high school seniors to participate in Extension's Local Government in Action program. About 30,000 seniors got involved in this educational program.

In New Hampshire, Extension workers helped a town save \$20,000 in ski trail development costs by training CETA (Comprehensive Employment and Training Act) workers in surveying and land-clearing techniques.

Payment Under Title V, Rural Development Act of 1972

Current Activities: The purpose of Title V is to assist states to establish programs for generating, interpreting, and applying knowledge needed by decisionmakers who manage or invest in facilities, services, businesses, and other enterprises contributing to rural development.

Extension inputs have been teamed with the grant, loan, and technical assistance programs of more than 40 major public organizations such as FmHA, HUD, SCS, EDA, LFAA, as well as those of the Farm Bureau, Chambers of Commerce, Salvation Army, a dozen or more service clubs, and financial institutions in the private sector. All projects are undertaken in cooperation with county, municipal, or multicounty planning and development bodies.

The program has supported projects in over 300 counties serving nearly 1,500 local communities. Of the 180 programs supported during FY 1978, 67 (37 percent) were aimed at providing economic opportunity in rural communities; 48 (27 percent) were aimed at enhancing the capacity of the community to solve its own problems; and 30 (17 percent) dealt with special needs of special audiences, including senior citizens, native Americans and youth, as well as development or rural development support systems such as computer modeling and the Federal Assistance Programs Retrieval System. An estimated 1,300 community projects were supported in these 180 programs. An individual field worker can provide support for and make university assistance available to between five and seven projects concurrently. During the past year, Title V projects have received about 377 staff years of extension and research assistance.

A study of Extension programs designated to help rural people to recognize and pursue economic opportunity was completed during 1979. That study explored the impact of Title V programs as well as other CRD efforts.

Payments to the District of Columbia

- The District of Columbia urban gardening program has provided citizens with educational opportunities and technical assistance in the science and art of vegetable gardening. More than 10,000 backyard gardeners received assistance, while approximately 5,000 families grew vegetables on private, public, and Federal land. In addition, 320 senior citizens participated in rooftop gardening, making a total of 15,320 District residents who produced fresh, nutritious vegetables contributing to improved diets and savings on family food budgets.
- Landscape, soils, and turf gardening programs focused on the care of ornamentals, lawn development, and the development of community beautification projects. A value of approximately \$355,000 was realized by 142 families who participated in the "do-it-yourself" lawn development program.
- Approximately 2,400 persons received training in the safe use of pesticides. Of this number, 1,530 passed the written examination, while 770 passed the practical.
- Through the home repair and energy program, 13,500 actual and potential homeowners were assisted in acquiring "do-it-yourself" home repair skills, including weatherization, wall caulking, plumbing, electrical and carpentry repairs. The average savings in home repair and fuel costs per individual was estimated to be \$350.

- More than 35,000 families were assisted in coping with inflation and the spiraling cost of living. Families learned ways to trim their budgets, provide services for themselves, judge quality, and minimize consumption. Participants also realized wardrobe savings through clothing exchange, recycling techniques, and other ideas.
- The 4-H Youth Program focused on developing responsible citizenship and enhancing the knowledge of high school students on the operations of the Federal and local government structures. Youth drafted and introduced a bill to the D. C. City Council to provide expanded educational opportunities for senior citizens. The bill resulted in the passage of the D. C. Senior Citizen Education Act. This Act will provide expanding educational opportunities from the University of the District of Columbia for 100,000 senior citizens.
- Approximately 850 youth and their families participated in a 4-H special food and nutrition project and learned the value of good nutritional habits as it pertains to health. Eighty percent of the participants were able to name the basic food groups with 100 percent accuracy, while 75 percent of the participants were able to plan a well-balanced meal, and carry it through the steps of food selection, preparation, and conservation.

Aid to Land-Grant Colleges for Food and Agricultural Science Education

Funds for this program are authorized under section 22 of the Bankhead-Jones Act of 1935 and are provided for support of instruction in agriculture, the meachnic arts, and related fields at the land-grant colleges.

Eleven million five hundred thousand dollars is currently available for this purpose of which \$8,100,000 is allotted and paid to each state, District of Columbia, Puerto Rico, Guam, and the Virgin Islands in equal shares of \$150,000 each. The remainder, \$3,400,000, is allotted and paid according to the population each of these recipients bears to the total population of the country as determined by the last decennial census.

SCIENCE AND EDUCATION ADMINISTRATION

Technical Information Systems

Purpose Statement

The Science and Education Administration's Technical Information Systems (SEA/TIS) (formerly National Agricultural Library) has as its ultimate purpose the dissemination of useful information about agriculture and other related sciences to scientists and researchers, administrators and managers, farmers, and to the general public. In addition to providing traditional library services such as bibliographies, reference services and document delivery to agricultural scientists and researchers, TIS is expanding its role and serving a wider audience by using modern information dissemination technology to its fullest. Traditionally, the library has concentrated its thrust towards the agricultural scientist and researchers. The wider audience includes Federal, state and local administrators, as well as the farmer, the small businessman, public groups at all levels, and the general public.

The foundation of TIS is the National Agricultural Library (NAL) unit which had its mission outlined by the Organic Act of 1862, establishing the Department of Agriculture. The act sets forth a basic mission, "to acquire and to diffuse among the people of the United States useful information on subjects connected with agriculture in the most comprehensive and general sense of the word," and placed upon the Secretary the responsibility to "procure and preserve all information concerning agriculture which he can obtain by means of books..."

TIS provides access to the world agricultural literature. Both current and historical information is collected and organized for effective utilization by a wide range of users.

TIS operations are carried out at the National Agricultural Library Building at Beltsville, Maryland. Specialized services are provided from a branch library in Washington, D. C., which includes the law collection and social sciences materials.

The NAL with approximately 1.6 million volumes of printed materials on agriculture and supporting scientific disciplines is among the largest in the world. Service is provided from these locations as well as 18 officially designated field libraries in the States and 30 "information" centers in various agencies of the Department. Collections in the field libraries and "information" centers total approximately a quarter of a million volumes.

These libraries are situated at field locations where concentration of work and research staff warrants on-site library services. The Director of SEA prescribes library policy, standards, and procedure for these field library services and exercises such controls as are needed to coordinate services in the Department. The Deputy Director, SEA/TIS, implements these policies, standards and procedures.

As of September 30, 1979, TIS employed 187 permanent full-time employees and 32 part-time employees, all located in Beltsville and Washington.

SCIENCE AND EDUCATION ADMINISTRATION

The estimates include appropriation language for this item as follows (new language underscored; deleted matter enclosed in brackets):

Technical Information Systems

For necessary expenses of the Technical Information Systems, /\$7,835,000/ \$8,789,000: Provided, That this appropriation shall be available for employment pursuant to the second sentence of section 706(a) of the Organic Act of 1944 (7 U.S.C. 2225), and not to exceed \$35,000 shall be available for employment under 5 U.S.C. 3109: Provided further, That not to exceed \$100,000 shall be available pursuant to 7 U.S.C. 2250 for the alteration and repair of buildings and improvements.

TECHNICAL INFORMATION SYSTEMS

Appropriation Act, 1980.....	\$ 7,835,000
Budget Estimate, 1981.....	<u>8,789,000</u>
Increase in Appropriation.....	<u>+954,000</u>

Adjustments in 1980:

Appropriation Act, 1980.....	\$ 7,835,000
1980 Supplemental Appropriation for pay costs...	<u>213,000</u>
Adjusted base for 1981.....	8,048,000
Budget Estimate, 1981.....	<u>8,789,000</u>
Increase over adjusted 1980.....	\$ <u>+741,000</u>

SUMMARY OF INCREASES AND DECREASES
(on basis of adjusted appropriation)

Item of Change	Increase or Decrease		
	1980 Estimated	Program Changes	1981 Estimated
Farm Business and Specialized Systems	\$ --	\$ +300,000	\$ 300,000
All Other	<u>8,048,000</u>	<u>+441,000</u> a/	<u>8,489,000</u>
TOTAL AVAILABLE	<u>\$ 8,048,000</u>	<u>\$ +741,000</u>	<u>8,789,000</u>

a/ Includes a total increase of \$91,000 for the portion of pay increases effective in FY 1980 which were absorbed in FY 1980 but which are needed to carry out the programs proposed in FY 1981 and \$350,000 for increased costs of operations.

PROJECT STATEMENT
(on basis of adjusted appropriation)

	:	1980	:	1981
	:	(Estimated)	:	(Estimated)
1. Agricultural Library Services for research and education:	:	:	:	:
	:	:	:	:
	:	:	:	:
	:	\$ 7,431,852	:	\$ 8,789,000
	:		:	
Unobligated balance	:	95,148	:	--
Total available or estimate	:	<u>7,527,000</u>	:	<u>8,789,000</u>
Proposed supplemental for pay increase costs	:		:	
Total, Appropriation	:	<u>7,527,000</u>	:	<u>7,835,000</u>

EXPLANATION OF PROGRAM

The basic function of the Technical Information Systems (TIS) unit of the Science and Education Administration is to identify, acquire, disseminate and deliver pertinent food and agriculture information to all scientists, researchers, administrators, and other workers in agricultural fields in both the government and the private sector. To meet these needs, TIS provides current awareness services about the worldwide agricultural literature and makes this information available

and accessible to users of these systems which include USDA scientists and other researchers, agricultural scientists at our land-grant universities and other institutions of higher learning and in state agricultural agencies; Federal and State administrators; farmers, farmer institutions, small businesses, and the rural and urban consumers. The on-line interactive bibliographic search and retrieval services are directed toward this purpose. The availability of these on-line data bases has generated an increased demand for all types of library services. The current research and information systems (CRIS) and similar systems were established to respond to this demand.

Acquisitions of agricultural materials continues to be a major activity in carrying out the mission of the Library. Other primary activities for fiscal years 1980 and 1981 are as follows:

<u>Types of Activities</u>	<u>Estimated Productivity</u>	
	<u>FY 80</u>	<u>FY 81</u>
Serial Issues Added	220,000	222,000
Number of Titles Cataloged	15,000	15,000
Articles Indexed	140,000	145,000
Volumes Bound	20,000	20,000
Document Requests Filled	340,000	340,000
Reference Inquiries Answered	49,000	49,000
Automated Searches Conducted	12,000	12,000
Current Awareness Literature		
System Profiles	26,000	27,000

A major objective of program in bibliographic control is to organize and announce agricultural publications so that they can be used. TIS catalogs books and journals newly acquired for the collection and indexed journal articles, conference proceedings, and reports carefully selected from the world's publishing output for their meaningful information on agricultural research. Bibliographic records of these publications are added to the computerized Agricola (Agriculture Online Access) data base. From this data base, information is disseminated in a variety of ways. It is accessible through commercial online services. It is also available in printed products.

Resources of the collection are made available through direct loan, inter-library loan of books, and photocopy of documents, primarily journal articles. Literature requests of USDA field employees in several areas of the U.S. are processed with the cooperation of the land-grant university libraries. The resources of these libraries are used first by field employees, with the Library component of SEA/TIS serving as back-up.

Through augmentation of its library and information network, TIS has expanded its services including current awareness literature systems and on-line retrieval service to all parts of the agricultural community and the general public. The Director of SEA has established a work group to prepare a plan for the conduct of a study to develop a more fully integrated and more widely acceptable Management Information System. TIS will focus its technical information program on three priority thrust areas of SEA: Human Nutrition, Natural Resources and Integrated Pest Management. The Food and Nutrition Information Center will expand its efforts in collecting, organizing and disseminating information about human nutrition research.

Simultaneously, TIS resources will concentrate in the area of natural resources to complement the on-going current awareness, literature retrieval and document delivery efforts of the Forest Service and the Soil Conservation Service. The needs for information on Integrated Pest Management (IPM) activities will be met by coordinating existing information sources to implement an IPM Information Center which will provide research, technical and applications information to scientists, extension specialists, farmers, farm supporting organizations and others.

In addition to the above, SEA/TIS must also provide for collection preservation. This involves the microfilming of restoring of important documents, unbound serial issues, newspapers, and historical materials.

Justification of Increases

(1) A net increase of \$741,000 for services consisting of:

(a) An increase of \$91,000 for FY 1980 pay increases.

(b) An increase of \$350,000 for Technical Information Systems for increased operating costs.

Need for Change. The increased funds are needed in order to maintain a current level of program effort.

Nature of Change. The costs of providing services has risen over the last few years especially for the purchase of books and journals, and the need to apply new technology. The cost of new publications is rising faster than the overall rate of inflation. Increased usage of on-line data bases coupled with an increase in demand for new services, such as the growth of the current awareness literature service, which in turn creates a greater demand in other areas such as document delivery service, have contributed greatly to the problem. These trends are expected to continue with little abatement in the foreseeable future. This increase would enable TIS to maintain the services it is currently providing.

(c) An increase of \$300,000 for farm business and specialized systems (no funds available in FY 80).

Need for Change. Advanced communications technology will provide faster and easier access to farm business decision information, enabling farm managers, extension specialists and others to respond rapidly to critical, high priority problems and issues. Small farms would benefit from easy, inexpensive access to computer programs tailored to assist them in managing their operations.

The aquaculture service center would provide a single source for research scientists, managers, extension specialists and others to rapidly obtain in-depth information on aquaculture. This would minimize the fragmented approaches now required for information gathering, and would facilitate technology transfer.

Nature of Change. There already exist some computer programs which allow a farmer to compare data for local conditions against stored tables, to determine whether to take certain actions. One such program recommends application of pesticides under certain combinations of local temperature and humidity levels. TIS will identify similar computer programs and data tables, which could be collected and made available to farms through an on-line computer system. Several on-line computer systems aimed at delivering useful information to the home and office (PRESTEL, SOURCE, PLATO, etc.) will soon be commercially available. TIS will contract with one or more of these systems to acquire and offer farmers, small rural businesses, and extension agents access to farm-oriented software and data files, for relatively low user charges.

TIS staff would determine research, extension and education needs for aquaculture information, and develop products and services to meet those needs, to be furnished by a specialized information center. The center would prepare directories of current research and comprehensive on-line data base retrieval services: identify new information sources and acquire new items for inclusion in NAL and AGRICOLA; locate and document private and other Federal research for inclusion in research directories; and maintain a staff person with expertise in aquaculture information.

Technical Information Systems (TIS)

Status of Program

The National Agricultural Library (NAL) a Division of TIS is being developed as the cornerstone of an expanding library and information network, dedicated to disseminating a wider range of technical information to a broader audience than in the past. It is one of three National libraries. The others are the Library of Congress (LC) and the National Library of Medicine (NLM).

With the enactment into law of the Food and Agriculture Act of 1977, the U.S. Department of Agriculture (USDA) has moved (1) to give increased prominence and status to the transfer of technical information to user groups; (2) to more fully integrate library and information activities with research, extension, and higher education programs; and (3) to consolidate major automated information systems with library operations to strengthen and enhance the collection and dissemination of technical information.

Current Activities:

SEA-Technical Information Systems (TIS) has three units: the Library Operations Division (NAL), the Information Systems Division and the Education Resources Division. These units interact to provide an expanded system for the collection and dissemination of technical information on agricultural research and development. The audience now includes personnel in the non-land-grant institutions, other government agencies, private industry, food and energy technologists, and others needing specialized information, as well as the traditional audience of scientists and technicians within the Federal research structure.

The NAL Division's policy takes into account the collections of the LC and NLM, and other libraries as sources of books, journals, or other material in their prime-collecting areas. Some subjects, however, are prime-collecting areas for more than one library; for example veterinary medicine for both NAL and NLM and nontechnical agriculture for both NAL and LC. Also, the requirements of Department staff often extend beyond the prime areas of agriculture into subjects covered by other collections, necessitating acquisition in those subjects. Often needs of users in a specialized area cannot be met satisfactorily by the usual interlibrary loan or copy arrangements due to copyright or restrictions of the other libraries. Therefore some collecting in the subject to provide reasonable document delivery services is needed and may overlap with other collections.

TIS uses the Medline search service of NLM and the interlibrary loan and photocopy services of both LC and NLM. The TIS data base is available to both LC and NLM through a commercial source, and TIS provides interlibrary loans.

Currently, the cataloging of many Federal libraries is entered and accessible (for shared cataloging and interlibrary loan) through the Ohio College Library Center (OCLC) on-line system. Many Federal libraries participate through the Federal Library Committee (FLC) network (FEDLINK). At present, all machine-readable cataloging records from LC are included as well as NAL records from 1975. The full CATLINE file from NLM is scheduled for entry soon. FLC receives OCLC tapes for all FEDLINK library records and plans to make them more accessible.

Since the search capabilities of OCLC system are limited, NAL is encouraging on-line information retrieval access to Federal library serial files without standardizing serial records. The USERLINE file, accessible through a commercial on-line system, placed serial files from NAL, NOAA, and EPA on-line side by side, searchable jointly as well as separately. NAL transferred a small amount to FLC to acquire the full file of LC serials in machine-readable forms and placed them on-line in the same commercial system. Federal policy ought to encourage other Federal libraries and STINFO centers to do likewise, and funds could be sought to begin linking unstandardized records from different libraries for the same title, perhaps by the International Standard Serial Number (ISSN).

TIS is funded to provide services without direct charges to USDA users including current awareness document delivery, reference, and on-line searches. Interlibrary loan of monographs is made without charge to all, but TIS imposes a small charge to cover operating cost for photocopies to external users outside the Department. Several reimbursable and reciprocal agreements are in force with other Federal libraries. On-site users have access to coin-operated copying machines, provided by the Associates of NAL, Inc.

The costs of providing these services have risen over the last few years, especially for the purchase of books and journals and the need to use new technology. Costs have also increased due to demand for new services, such as the current awareness and on-line search services. These trends are expected to continue, except that the unit costs for use of new technology in computers and communications are expected to decrease. One strategy for keeping the costs down is to increase cooperation. TIS attempts to relate to other major producers of agricultural citation data bases, such as AGRIS, with the intent of cutting back on indexing of foreign agricultural materials and further cooperation with the Commonwealth Agricultural Bureaus and hopes to share the responsibility for more in-depth analysis of English language agricultural publications.

Selected Examples of Recent Progress:

Regional Document Delivery System. This cooperative effort with Land-grant libraries to get necessary literature to USDA field personnel was expanded from 25 to 27 States plus Puerto Rico. The land-grant university libraries and cooperating forestry institutions in the States serve as the primary source for literature needs and are reimbursed by TIS for this service. The regional structure was changed from five to six for greater equalization of requests received and for efficiency of operation. Regional centers now are the land-grant libraries in the States of California (Davis), Georgia, Iowa, Minnesota, Texas, and Washington. Costs jumped over 10 percent above that of the previous year although the delivery costs are still very low because of the cooperative investment by the States.

Conferences. In cooperation with the Animal and Plant Health Inspection Service, an International Symposium on Animal Health and Disease Data Banks was held in December 1978 with 120 persons attending from 15 countries. This effort to bring together persons concerned with computerized information in the areas of bibliography, epidemiology, laboratories, clinics, research underway, animal production, and economics was very successful. This was the first meeting of an international group concerned with the exchange of information in this subject area. A Proceedings volume was published and

offers the first major summarization of the state-of-the-art and problems in animal health information gathering and use. Nearly a year later land-grant librarians and information handlers met jointly with the National Association of State Universities and Land-Grant Colleges' Agriculture Division to explore the rapid advances of information technology and the responses agriculture must make to them.

Publications. A new Department publications series, Bibliographies and Literature of Agriculture (BLA), was created by the Office of Governmental and Public Affairs (GPA) in response to a proposal made by the SEA-Technical Information Systems. For the first time, the series established for the USDA a centralized source for bibliographical and related information for the entire Department. In FY 1979 SEA/TIS prepared for publication 17 manuscripts of which 7 were bibliographies, 4 were data bank reviews and manuals, and the remainder were popular publications such as the "TIS Guide to Services," and the "NAL Bookstack Directory."

Visitor Tours and Briefings. Progress has been made through the TIS/Educational Resources Division to improve the kinds of tours and briefings offered. Fifty-nine separate tours of TIS operations in the NAL Building were conducted for 295 visitors, including 139 from foreign countries. Tours and briefings were arranged for the Library of Congress, the National Technical Information Service, Georgetown University, Palmer Graduate Library School, National Library of Medicine, U.S. State Department, USDA Graduate School and other institutions.

Library Use and Information Network. TIS, under Congressional mandate, is examining various communications and delivery systems to determine which system has the highest potential for quick and effective transfer of information. The key question to be answered is: How can TIS help individuals, communities, and organizations do a better job of problem solving and decisionmaking in those areas for which the Department has a statutory mission to be helpful? A contract was awarded to Consumer Dynamics, Inc., to do a TIS marketing study. Phase I of the study, to be completed by May 1980, will establish a data base and replicable methodology for the systematic accumulation of information on problem areas. Phase II, the in-depth analyses of problem areas, will be completed by November 1980.

The following is a geographic breakdown of obligations and staff-years by locations:

	1979		1980		1981	
	: Staff		: Staff		: Staff	
	: Amount	: Years	: Amount	: Years	: Amount	: Years
Washington, D. C....:	668,867	17.2	735,000	17.2	735,000	17.2
Beltsville, Md.....:	6,762,985	184.8	7,313,000	184.8	8,054,000	184.8
Total.....	7,431,852	202.0	8,048,000	202.0	8,789,000	202.0

Status of Construction Projects as of December 1979

Status of research facilities authorized in prior years, and reported as uncompleted in the 1980 Explanatory Notes, is as follows:

NOTE: (Design criteria provided by AR to specify the program requirements and form the basis for negotiation of architect-engineer contracts. Diagrammatic drawings or concept drawings provide the basis for the first review of the architect's design. Tentative drawings or architect's design are provided by the architect for firming up cost estimates and a basis for developing the completed, and final working drawings.)

Location and PurposeColorado, Fort Collins
Animal Disease CenterFunds ProvidedAmountYear

1979 Plans	\$ 700,000	Design criteria is being developed. AE contract expected to be awarded in the second quarter of fiscal year 1980.
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Indiana, West Lafayette
Soil Erosion Center

1978 Plans	400,000	Architect's design was completed in the fourth quarter of fiscal year 1979. Construction contract was awarded in the first quarter of fiscal year 1980. Construction expected to be completed in the third quarter of FY 1981.
1979 Construction	3,600,000	
1979 Supplemental	<u>720,000</u>	
Total	4,720,000	

Massachusetts, Boston
Adult Human Nutrition Laboratory

1978 Plans	2,000,000	AE contract was awarded in the fourth quarter of fiscal year 1978. Architect's design was completed in the fourth quarter of fiscal year 1979. Construction contract was awarded in first quarter of fiscal year 1980. Construction expected to be completed in the first quarter of fiscal year 1982.
1979 Construction	<u>21,100,000</u>	
Total	23,100,000	

Status of Construction Projects as of December 1979-Cont.

<u>Location and Purpose</u>	<u>Year</u>	<u>Funds Provided</u>	<u>Amount</u>
<u>New York, Plum Island</u>			
Additional Animal Laboratory Facilities			
1973 Plans		\$ 250,000	
1976 Construction		10,000,000	
1977 Redirection		294,000	b/
1977 Redirection		700,000	c/
1978 Redirection		900,000	d/
Total		<u>12,144,000</u>	
<u>North Dakota, Grand Forks</u>			
Human Nutrition Research			
1976 Plans		225,000	
1978 Construction		<u>3,500,000</u>	
Total		<u>3,725,000</u>	
<u>North Dakota, Fargo</u>			
Headhouse/greenhouse			
1980 Construction		1,200,000	
<u>Oklahoma, El Reno</u>			
Feed Mill Replacement			
1978 Construction		1,500,000	a/
1979 Construction		300,000	
1980 Construction		1,000,000	
Total		<u>2,800,000</u>	
<u>Oklahoma, Stillwater</u>			
Headhouse/greenhouse			
1979 Plans.....		170,000	
1980 Construction.....		<u>1,700,000</u>	
Total.....		1,870,000	

Construction of facility was halted in March 1979 due to default of the contractor. A Construction Management Contractor is completing a reassessment of the entire project and will be providing a revised cost estimate in the third quarter of fiscal year 1980 to complete the facilities.

AE contract was awarded in the fourth quarter of fiscal year 1978. Architect's design was completed in the third quarter of fiscal year 1979. Invitation of construction bids resulted in all bids exceeding funds available. Consideration being made as to whether project can be reduced in scope to stay within available funds and provide a functional facility.

AE contract was awarded in the fourth quarter of fiscal year 1979. Architect's design is expected in the third quarter of Fiscal Year 1980. The land/lease arrangements are in progress. Construction contract is expected to be awarded in the fourth quarter of Fiscal Year 1980.

Status of Construction Projects as of December 1979-Cont.

<u>Location and Purpose</u>	<u>Year</u>	<u>Funds Provided</u>
		<u>Amount</u>
<u>Texas, Lubbock</u>		
Moisture Conservation and Plant Stress Laboratory	1978 Feasibility Study..... 1979 Plans..... Total.....	\$ 100,000 800,000 <u>900,000</u>
		Design criteria being prepared. AE contract expected to be awarded in the second quarter of fiscal year 1980.
<u>West Virginia, Beckley</u>		
Soil and Water Conservation Research	1972 Plans..... 1973 Construction..... 1976 Redirection..... 1977 Redirection..... Total.....	70,000 700,000 40,000 <u>e/</u> <u>1,509,000</u> <u>c/</u> <u>2,319,000</u>
		Construction contract was awarded in the third quarter of fiscal year 1978. Construction expected to be completed in the second quarter of fiscal year 1980.
<u>Wisconsin, Madison</u>		
Dairy Forage Research Center	1978 Plans..... 1979 Construction..... Total.....	1,100,000 <u>3,000,000</u> <u>10,100,000</u>
		This facility will be located on Baraboo field site (military base). AE contract was awarded in the fourth quarter of fiscal year 1978. Architect's design was completed in the third quarter of fiscal year 1979. Construction contract awarded in fourth quarter of fiscal year 1979. Construction expected to be completed in the fourth quarter of fiscal year 1980.
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		University of Wisconsin campus site: Concept drawing received the first quarter of fiscal year 1979. Architect's design was completed in the fourth quarter of fiscal year 1979. Construction contract awarded in the first quarter of fiscal year 1980. Construction expected to be completed in the third quarter of fiscal year 1981.

Footnotes:

a/ Planning funds were not appropriated separately, but are included in the funds appropriated for construction.

b/ \$194,000 were redirected from the air pollution abatement and sewage treatment project to provide funds for pollution abatement facilities in the animal and laboratory project as originally planned. An additional \$100,000 has been redirected into the animal and laboratory project from program funding.

c/ Due to cost escalation and to provide funds to complete facilities as originally planned and designed at the Beckley, West Virginia, project and the Plum Island animal and laboratory project, funds were redirected from Kearneysville, West Virginia.

d/ Program funds in the amount of \$900,000 were reprogrammed to finance additional costs for this project.

e/ Due to cost escalation, funds for the Ithaca, New York, project were redirected to Beckley, West Virginia, to provide sufficient funds to construct the facility.

Passenger Motor Vehicles

The 1981 Budget Estimate does not include the purchase of additional passenger motor vehicles to add to its total of 472 passenger motor vehicles.

The passenger motor vehicles of this Agency are used by research scientists and staff personnel in the course of their daily work. These vehicles are operated chiefly at field stations engaged in research. These vehicles are used in travel where common carriers are seldom feasible. This involves travel to individual farms, ranches, commercial firms, cooperating experiment stations, etc. The vehicles are essential for collecting experimental data and materials necessary for facilitating research work.

It is SEA's policy to pool the use of motor vehicles to keep the number of vehicles to a minimum and reduce overall costs for maintenance.

Replacement of passenger motor vehicles. Replacement would be made of 47 of the 472 (including 8 buses) passenger motor vehicles operated at field stations engaged in research. It is estimated that all of the 47 passenger vehicles to be replaced will have mileage of more than 60,000 or be 7 or more years old.

Age and Mileage Data for passenger-carrying vehicles on hand as of September 30, 1979:

<u>Age-Year Model</u>	<u>Number of Vehicles*</u>	<u>Percent of Total</u>	<u>Lifetime Mileage (thousands)</u>	<u>Number of Vehicles*</u>	<u>Percent of Total</u>
1974 or older	247	52	80-100 and over	29	6
1975	27	6	60-80	86	18
1976	45	10	40-60	121	26
1977	45	10	20-40	113	24
1978	68	14	Under 20	123	26
1979	<u>40</u>	<u>8</u>	<u>--</u>	<u>--</u>	<u>--</u>
Total	472	100		472	100

* Includes 6 vehicles used in foreign countries, and 8 buses.

Aircraft

There are no planned additions or replacements for any of the seven aircraft owned by this Agency in FY 1981. These aircraft are located at College Station, Texas; Weslaco, Texas, and Yakima, Washington. They are used in control methods, application of agricultural materials, infrared and color photography, and evaluating efficiency affects on weather conditions.

